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ACORN USER

DEEP IMPACT

Why RISC OS is a star in space science



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ISSUE 220 MAY 2000 £4.20

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RiscStation

More memory, more storage, more value!









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RISC OS 4.03

64Mb 60ns EDO System Memory

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4/6Mb ROM/Flash Memory containing RISCOS 4 and Utilities

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Minimum 60 Watts External Stereo Speakers

2 x Serial Port **Rated at 460k baud*
2 x PC Style Game Port supporting Midi In/Out/Through
2 x High Speed EIDE Ports **Supporting up to 4 devices*
1 x 10baseT Network Port with Wake On Lan Support
1 x EPP/ECP Fast Parallel Port
1 x IRDA Infrared Interface Support
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Full 16Bit OPL3 Stereo Sound Sampler & Mixer with FM Synthesizer support, 2 CD Mixer Ports 3 x 3.5mm Jack Sockets for Line in/Mic In/Headphone & Speaker Out

PS2 Style Keyboard Input
PS2 Style 3 Button Mouse Input

Easi Writer Pro, DrawWORKS Millenium, Fireworkz Pro, Ankh, Botkiller II and much more free software.

From £579 + VAT

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RISC OS 4.03

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2.1Gb EIDE Hard Drive

4/6Mb ROM/Flash Memory containing RISCOS 4 and Utilities

Micro ATX Desktop or Mini/Midi Tower Configuration

2 x Serial Port **Rated at 460k baud*
2 x PC Style Game Port supporting Midi In/Out/Through
2 x High Speed EIDE Ports **Supporting up to 4 devices*
1 x 10baseT Network Port with Wake On Lan Support
1 x EPP/ECP Fast Parallel Port
1 x IRDA Infrared Interface Support
1 x High Density Floppy Drive Port
1 x 15Pin VGA Connector

Full 16Bit OPL3 Stereo Sound Sampler & Mixer with FM Synthesizer support, 2 CD Mixer Ports 3 x 3.5mm Jack Sockets for Line in/Mic In/Headphone & Speaker Out

PS2 Style Keyboard Input
PS2 Style 3 Button Mouse Input

Networx software pack.

From £449 + VAT

RiscStation Ltd.
168 Elliott Street
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Email : info@riscstation.co.uk
Website : www.riscstation.co.uk



May 2000 ACORN USER

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Regulars

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If you have failed to notice the promotion of Internet phones throughout the Media – you're a lucky person. The "trouble and strife", who writes the Education pages for *Acorn User*, was recently commissioned to write a feature about Internet phones for the *Times Ed*. Apart from research via the Internet (though from a static machine in the comfort of her own home) she also did a straw-poll of six experienced computer users.

"Would you use one?" she asked. And the one hundred per cent reply was: "No."

The range of reasons went from "the screen and the keyboard would be too small" through "the bandwidth is pitiful and useless" to "with a normal phone you can do something else, but an Internet access ties up your most important resource, your eyes". In other words, unlike a cow, you can't walk and browse.

The idea that there would be special Mobile Phone web pages was met with derision "what? More exceptions and stupid guff to download"; while the development of exciting new Mobile Internet applications was greeted with an equal lack of enthusiasm. A combined map system and GPS seemed interesting but then: "you have to stay online the whole time?"

Well, yes. There was just no convincing them: "the Japaneses have bought millions", but then they would, they love their gimmicks, how many of them actually use these phones for Mobile Internetting?

Cynicism rules.

I admit I was one of the six but then, I don't even own a mobile phone.

Steve Turnbull
Editor

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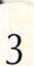
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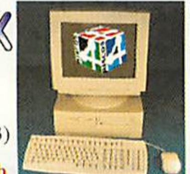
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50 mip Arm7500 system with 8Mb memory, built in Midi support, 3D sound, & sampler support, 10baseT port as standard, RISCOS 4 as standard, High speed serial , High speed parallel, expandable to 256Mb memory & hard drive / CD-ROM etc.

RiscStation Lite R7500



RiscStation Lite base from **£499** + Vat (£586.33)

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RiscStation Lite R7500+

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R7500 base only	£499 + Vat	(£586.33)	(£19.16)
15" monitor system	£599 + Vat	(£703.83)	(£22.99)
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19" monitor system	£749 + Vat	(£880.08)	(£28.75)

Also available the LitePlus with 64MB / 8G HD			
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LitePlus 15" system	£679 + Vat	(£797.83)	(£26.06)
LitePlus 17" system	£729 + Vat	(£856.58)	(£27.98)
LitePlus 19" system	£829 + Vat	(£974.08)	(£31.82)

Internet Packs

available for all machines include Internet software, ISP setup and 56K modem
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Acorn SA 233 T RiscPC

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We can supply any combination or configuration you require.

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Above prices do not include monitors please see separate price list

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15" SVGA 0.28 (3yr on-site)	£95.00	£111.62
15" SVGA 0.28 Multi-Media	£119.00	£139.83
17" SVGA 0.28 (1yr RTB)	£127.65	£149.99
17" SVGA 0.28 (3yr on-site)	£149.00	£175.08
19" SVGA 0.26 (3yr on-site)	£249.00	£292.57
21" SVGA 0.25 (3yr on-site)	£540.00	£634.50
38" SVGA M-M (1yr on-site)	£1445.00	£1697.88
15" Iiyama Vision Master 350	£145.00	£170.37
17" Iiyama Vision Master FST	£235.00	£276.12
17" Iiyama Pro 410	£249.00	£292.57
19" Iiyama Pro 450	£390.00	£458.25
21" Iiyama Pro Diamondtron	£630.00	£740.25
AKF52 Multisync 14" 1yrRTB	£149.00	£175.08
AKF12 PAL 14" refurb 90 days	*£49.00*	£57.58
AKF52/53 M/sync refurb 90 days	*£99.00*	£116.32
AKF60 SVGA 14" refurb 90days	*£59.00*	£69.33
Multisync A300/A3000 cable	£8.50	£9.99

All monitors inc 3 yrs wty unless specified

BEST PRINTER PRICES

		Ex VAT	Inc VAT
Canon BJC 1000 colour	A4	£59.00	£69.33
Canon BJC 2000 colour #	A4	£75.00	£88.12
Canon BJC 2000 Scan #!	A4	£139.00	£163.33
Canon BJC 4650 colour #	A3	£222.00	£260.85
Canon BJC 4650 Scan #!	A3	£275.00	£323.12
Canon BJC 7000 colour #	A4	£165.00	£193.87
Epson Stylus 460 colour	A4	£69.00	£81.08
Epson Stylus 660 colour	A4	£85.00	£99.87
Epson Stylus 860 colour	A4	£165.00	£193.87
Epson Stylus 1520 colour	A3	£340.00	£399.50
Epson Stylus Photo 750 #	A4	£159.00	£186.83
Epson Stylus Photo EX #	A3	£225.00	£264.37
HP 610C colour	A4	£69.00	£81.08
HP 895CXI colour	A4	£169.00	£198.58
HP LASERJET 1100		£249.00	£292.57
HP LASERJET 2100 PCL		£454.00	£533.45
HP LASERJET 2100 PS		£514.00	£603.95
Photo drivers for #		£58.72	£69.00
Scanner drivers for !		£29.79	£35.00

FREE Acorn driver by request

HARD DRIVES / SUB-SYSTEMS

	A3020		A30X0 & I/F	
	Ex VAT	Inc VAT	Ex VAT	Inc VAT
60/80MB	£39.00	£45.83	£79.00	£92.83
170MB	£49.00	£57.58	£89.00	£104.57
340MB	£59.00	£69.33	£99.00	£116.32
500MB	£79.00	£92.83	£119.00	£139.83
810MB #	£99.00	£116.32	£125.00	£146.87
1.0Gb #	£109.00	£128.08	£134.00	£157.45
2.1GB #	£123.00	£144.53	£149.00	£175.08
3.2GB #	£129.00	£151.58	£155.00	£182.12
4.3GB #	£149.00	£175.08	£175.00	£205.62

A30X0 version includes CD ROM i/f which can be used in A3020 or A4000. For external A3000 i/f add £20.00 +VAT   # includes partitioning software

3.5" IDE Hard Drives

	Ex VAT	Inc VAT
210Mb	£25.00	£29.37
250MB	£30.00	£35.25
420MB	£40.00	£47.00
500MB	£49.00	£57.58
1.2GB #	£55.00	£64.62
2.1GB #	£60.00	£70.50
4.3GB #	£70.00	£82.25
6.4GB #	£75.00	£88.12
8.4GB #	£80.00	£94.00
10.2GB *	£90.00	£105.75
16.8GB *	£100.00	£117.50
20.1GB *	£110.00	£129.25
25.0GB *	£149.00	£175.08
36.4GB *	£220.00	£258.50

requires RISCOS 3.6 /3.7 * requires RISCOS 4
Partitioning s/w for only £25.00 + vat

SCSI HARD DRIVES

1Gb	£50.00	(£58.75)
2Gb (5400 rpm) special	£80.00	(£94.00)
2Gb (7200 rpm) #	£100.00	(£117.50)
4.3Gb (5400 or 7200rpm)	£135.00	(£158.63)
9.1Gb (7200rpm)	£165.00	(£193.88)
18.6Gb (7200 rpm)	£255.00	(£299.63)
36.4Gb (7200 rpm)	£540.00	(£634.50)

For EXT. SCSI 1 case £50.00 + VAT (inc. cable)
For EXT. Dual SCSI 1 case £65.00 + VAT (inc. cable)
For EXT. SCSI II case £55.00 + VAT (inc. cable)

Removable Drives

IDE LS120 int	£45.00	(£52.88)
IDE Zip 100 int	£55.00	(£64.63)
IDE Zip 250 int	£119.00	(£139.83)
IDE 2.2 GB Orb	£175.00	(£205.63)

IDE require drivers or Suitable hardware support

Parallel Drives including RISCOS Software

Zip 100	£99.00	(£116.33)
Zip 250	£135.00	(£158.63)
Jaz 2G	£299.00	(£351.33)

SCSI Drives

Zip 250M ext	£115.00	(£135.13)
Nomai 750(270&135sq)	£159.00	(£186.83)
Jaz 2G int	£235.00	(£276.13)
Jaz 2G ext	£235.00	(£276.13)

Removable Drive media

	ex VAT	inc VAT		ex VAT	inc VAT
CDR CD-ROM	£1.28	£1.50	100Mb Zip	£8.00	£9.40
CDR 10 pack	£10.00	£11.75	Zip 5 pack	£35.00	£41.13
CDR 25 pack	£21.28	£25.00	250Mb Zip	£12.76	£14.99
CDR 80min 10 pck	£12.00	£14.10	120M LS 120	£7.00	£8.23
CDR 80min 25 pck	£25.53	£30.00	650Mb PD	£19.00	£22.33
CDR/W CD-ROM	£3.00	£3.53	750Mb Nomai	£38.00	£44.65
CDR/W 10 pack	£25.00	£29.37	1Gb Jazz	£58.00	£68.15
CDR/W 25 pack	£50.00	£58.75	2Gb Jazz	£69.00	£81.08
5.2Gb DVD RAM	£25.00	£29.38	2.2GB ORB	£33.00	£38.78



RISC OS 4

£99.00 (£116.33)

Fitting & data transfer, if required, £25 inc or £15 with new HD

CD-ROM WRITERS

Prices Start from £139.00 +

4x4x16x Yamaha	£139.00	(£163.33)
6x4x16x Yamaha	£169.00	(£198.58)
6x4x24x Memorex	£189.00	(£222.08)
CD-BURN	**£49.00**	**(£57.58)**
CD-SCRIBE 2	**£49.00**	**(£57.58)**

CD-ROMS



SCSI 8x **Autochanger** £75.00 + vat (£88.13)

IDE			SCSI		
48x	£39.00	(£45.83)	40x	£65.00	(£76.38)
40x	£35.00	(£41.13)	32x	£55.00	(£64.63)
8x	£30.00	(£35.25)	8x	£30.00	(£35.25)

IDE driver for Risc OS 3.5 £15 + vat
IDE int. fitting kit £5 inc. Int. SCSI fitting kits from £10 + vat

External CD ROMs

40x CD Tower (6 SCSI drives) space for HD £449 + VAT

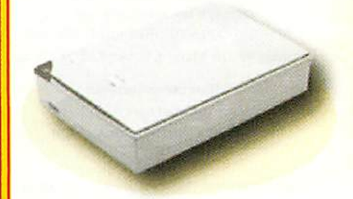
40x IDE (with cable)	**£85 + VAT**
8x SCSI 1 (with cable)	**£85 + VAT**
40x SCSI I(with cable)	**£115 + VAT**
40x SCSI II(with cable)	**£120 + VAT**

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56k x2/V90 3Com USR	£118.30	£129.00
56k Flex/V90 (Rockwell)	£55.32	£65.00
ISDN modem (external)	£99.00	£116.33
ANT Internet Suite	£110.00	£129.25
Webster XL	£21.28	£25.00
Messenger Pro	£25.53	£30.00
!Java CD	£33.19	£39.00
ArcFax Fax software	£26.38	£31.00

COLOUR SCSI SCANNERS

All scanners inc Acorn Software



P'llel Mustek 600dpi	£99.00	(£116.33)
Mustek A4 600dpi	£119.00	(£139.83)
Mustek A4 1200dpi	£149.00	(£175.08)
Epson GT7000	£199.00	(£233.83)
Epson GT7000P	£249.00	(£292.58)

ImageM & Twain also available separately

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EESOX SCSI 32-bit DMA	**£109.00**	**£128.06**
Storm SCSI 8-bit (A30x9 int)	£88.00	£103.40
Storm SCSI 16-bit (podule)	£96.00	£112.80
Storm SCSI 32-bit DMA (podule)	£128.00	£150.40
Simtec 8-bit (A3000/A3010)	£55.00	£64.63
Simtec 16-bit (AX00/A5000/RPC)	£45.00	£52.88
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A3000 1-2Mb Non-Upgradeable	£15	£17.63
A3000 1-4Mb Upgrade	£35	£41.13
A3000 Serial Port Upgrade	£19	£22.33
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A3010 1-2Mb Upgrade	£20	£23.50
A3010 1-4Mb Upgrade	£45	£52.88
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* rework if required	£25	£29.38

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£25.00 exc Vat (£29.38)

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16Mb SIMM	£20.00	£23.50
32Mb SIMM EDO	£42.00	£49.35
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2Mb VRAM	£75.00	£88.12
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33 Mhz Arm 3 upgrade SPECIAL

with FPA socket	£45.00	£55.88 inc.
FPA 10 (25Mhz)	£84.26	£99.00 inc.

RPC 16 bit Audio & mixer £59

NETWORKING

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A3000 int. 10base2 or T, Access+	£89.00	£104.58
A400/A5000 10base2 or T Access+	£89.00	£104.58
A400/A5000 10base2 & T Access+	£99.00	£116.33
A3020 10base2 Access+/ext. MAU	£94.00	£110.45
A3020 10baseT Access+/etx. MAU	£94.00	£110.45
Risc PC/A7000 10base2 & T Acc+	£99.00	£116.33
Risc PC/A7000 10base2 Access+	£79.00	£92.83
Ant Access + ROM upgrade	£10.00	£11.75

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8 Port 10bT +1 10b2	£35.00	£41.12
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8 Port 100/10 Auto	£99.00	£116.32
18 Port 10 16T+ 2BNC	£75.00	£88.12
16 Port 100/10 Auto	£229.00	£269.07
16 Port 100/10 Auto (inc 3 port switch)	£269.00	£316.07
24 Port 100/10 Auto	£299.00	£351.32
24 Port 100 *special*	£249.00	£292.57

Cables

2M	£3.00	£3.53
3M	£5.00	£5.88
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10M	£10.00	£11.75
20M	£15.00	£17.63

State 10base2 or 10baseT
any size made to order

We supply and / or install all network components please ring for your requirements

NETWORKING SOFTWARE

Topcat site licence	£489.00	(£587.50)
NTfiler site licence	£97.00	(£113.98)
Omniclient site licence	£489.00	(£587.50)
Lanman98 single user	£35.00	(£41.13)
Win95FS single user	£35.00	(£41.13)
Lanman or Win95FS 10 user site licence	£110.00	£129.25
Lanman or Win95FS 20 user site licence	£156.00	£183.30

MICE & KEYBOARDS



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	Ex. VAT	Inc. VAT
Acorn Trackerball/Mouse NEW	£29.79	£35.00
Acorn Original Mouse	£20.00	£23.50
Acorn ERGO Mouse NEW	£12.00	£14.10
A7000 replacement Mouse NEW	£10.00	£11.75
Ergo (std) Risc PC Keyboard	£21.28	£25.00
Ergo curved Risc PC Keyboard	£29.78	£35.00
A400/A5000 replacement K/brd	£59.00	£69.33
A400/A5000 Ergo Keyboard	£69.00	£81.08
A4 replacement keyboard	£49.00	£57.58
A4000 Keyguard (special needs)	£25.00	£29.37
A3000 /A300,400,500 Keyguard	£25.00	£29.37
A3 touchpad for Concept Keybrd	£25.00	£29.37

Cooling Fans	Ex VAT	Inc VAT
Fan for A310/400	£15.00	£17.62
Fan for RPC/A7000	£15.00	£17.62
Fan for PC-Co processor	£4.00	£4.70
5.25" Hard Drive fan kit	£15.00	£17.62

ACORN MKII TRACKBALL & MOUSE



£29.79 + (£35.00)

Replacement Floppy Drives

A3000/400/500 £29.00+vat (£34.08)
A30X0/4000/5000 floppy allows cross - formatting of HD and DD discs
£29.00+vat (£34.08)

POWERED SPEAKERS

	Ex. VAT	Inc. VAT
60 watts with PSU	£13.50	£15.86
240 watts with PSU	£21.00	£24.68
Subwoofer system	£42.00	£49.35

Character Mouse Mats

Southpark Kenny	£4.99
Southpark Cartman	£4.99
Disney Mickey, Pooh, Donald, etc	£4.99
X-Files (four types)	£4.99
Garfield or novelty	£4.99
Standard mat £1.00 / Econ. £0.65	

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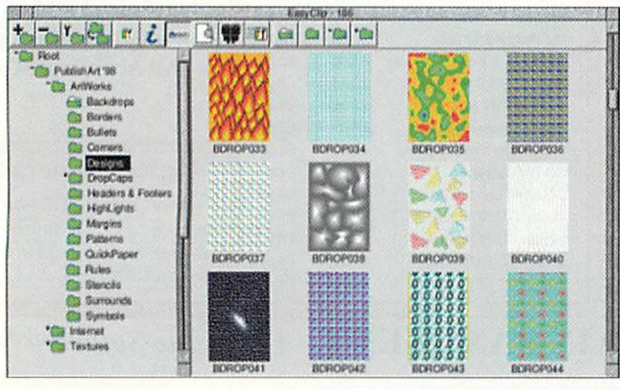
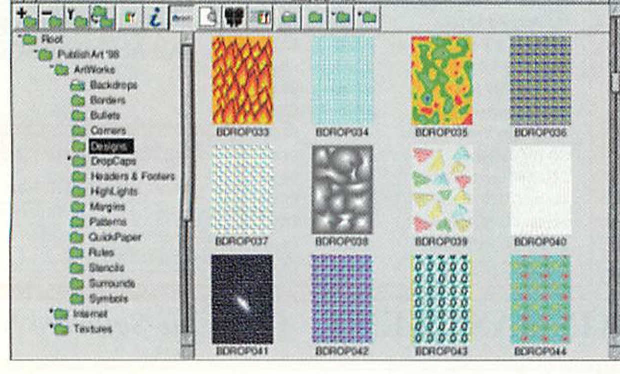
EasyClip does it

Following R-Comp's acquisition of *EasyClip 2* from Fabis earlier this year, the company has released *EasyClip 2.10b*.

This new version, the first developed in house by R-Comp, adds numerous enhancements to the product including keyboard shortcuts and other keyboard entry enhancements, much improved online help systems, user interface improvements and various bug fixes.

All registered *EasyClip 2.05* users should have received the updated version automatically by now. However, not everyone included e-mail details when originally upgrading to version 2.05.

If you think you should have received v2.10b you're advised to contact R-Comp. If you still have an earlier Fabis version of EasyClip 2 and have not upgraded to the R-Comp release, the cost is £7. Upgrades from *EasyClip 1* cost £15. For new users, *EasyClip 2.10b* is available for just £25.

R-Comp explains that some of its traditional customers have asked how *EasyClip* fits into the R-Comp range of Internet and Web products.

According to R-Comp's Andrew Rawnsley: "The answer is in the way we use it here – to catalogue and organise Web images, buttons, backgrounds, logos and other graphical resources in a single, centralised, WYSIWYG fashion.

"This is particularly useful if you are developing multiple Web sites, where you can store all artwork pertaining to each site in separate EasyClip sections, making managing and maintaining much easier."

Andrew also adds that if you are running a business, it is also extremely useful to be able to store business logos and illustrations alongside Web images, all in one convenient location.

R-Comp, tel: 01925 755043, web: **http://www.rcomp.co.uk/**



Father of Eidos leaves RISC OS behind

Stephen Streater, co-founder of the wildly successful Eidos company, has made a career change and set up a new company, Forbidden Technologies, to concentrate on digital video compression technologies. Streater was, and maybe still is, a huge fan of the Acorn hardware platform and RISC OS.

Eidos was originally set up to use RISC OS as a platform for inexpensive professional off-line video editing solutions using proprietary digital video compression. The company almost accidentally became involved in the computer games market and last year Eidos parted company with Streater after a corporate decision was made to concentrate on the games industry alone.

Streater made an early offer to Acorn in an attempt to acquire parts of the cancelled Phoebe project and RISC OS software required for upgrading the Eidos Optima video editing platform from the Risc PC. That failed and possibly marked the end of Streater's love affair with the platform.

Forbidden Technologies needs a reliable hardware platform with a long term future and it looks like Risc PCs and RISC OS don't cut the mustard any more.



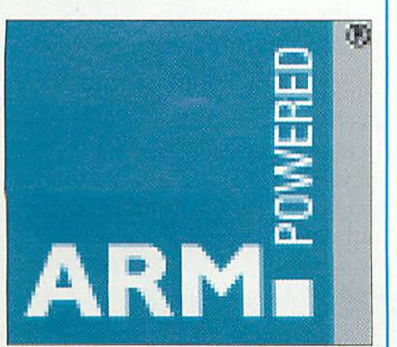
ARM shares over-valued?

Last month we brought news of more positive growth from ARM Ltd. The company's share price has continued to rise since then. Its market capitalisation is now valued at over £8 billion – quite remarkable for a company which only had a turnover of £62 million during 1999. It seems ARM is now being viewed as a bubble which could burst.

Nomura, a major global investment house, has warned its customers of this very concern. The interesting thing is that almost anyone you talk to who knows anything about ARM seems to agree the share price is ridiculously over-priced, but there is also just as much confidence that the share price will continue to grow.

As for ARM's prospects, they remain excellent. Revenues from mobile phone industry licensees will continue to rise exponentially as analysts predict mobiles across the world will catch up and surpass the number of PCs and Internet-enabled set-top boxes over the next five years. The ARM platform is the dominant technology in this field.

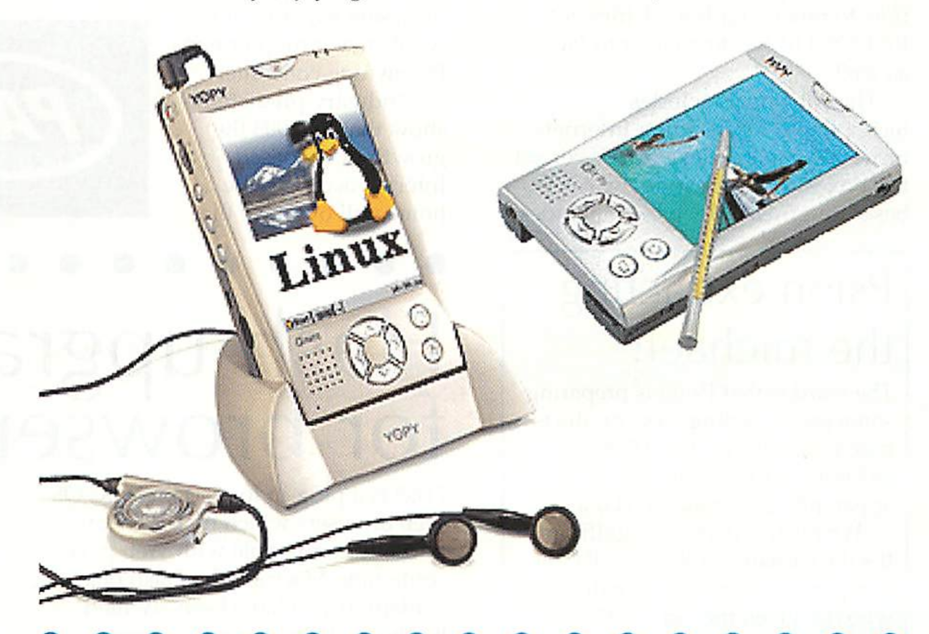
Plus, ARM is making a bid for the very lucrative automotive systems market. There have been mixed results in the PDA scene, with – apart from Psions – ARM processors failing to get a toe-hold in the compact Windows CE form factor end of the market, but potential there remains. Your news editor has often wondered why he hasn't got around to buying ARM shares. Besides pleading poverty and, perhaps, stupidity, these days I think the reason could be safely described is 'too scared'!



Linux-based StrongARM PDA

Acorn has had close links with Korean developers in the past and while there is no obvious link between old Acorn relationships and Samsung's new pen-based PDA, the amusingly named Yopy, the device has to represent a potential home for RISC OS in the same way that RISCOS Ltd is porting RISC OS to the Psion Series 7/netBook platform.

Linux is currently enjoying a surge of interest that was very apparent at CeBIT in Hannover, Germany, last February. It's remarkable that Linux, an operating system derived from one the size of Unix has, has found its way into a pocket-sized battery powered product like the Yopy. There are lots of reasons why RISC OS would have been, technically, just as good a choice – better, even.



Surrey and Sussex Acorn User Group

The Surrey and Sussex Acorn User Group (SASAUG), which has just celebrated it's third Birthday. Members come from as far afield as the outskirts of London down to the South coast, also from Kent and Hampshire. Recent presentations have been given by Spacetech, Atomwide, iSV, APDL, RISCOS Ltd and the ARM Club, while members have given talks on video editing and Linux. The club's programme for the next four months includes: 10th April – Acorn Publisher (Mike Williams), 8th May – Acorn technical matters (Paul Vigay), 12th June – The Data Store (David Coronel) and 10th July – update on Linux (Chris Sawer), the latter to be confirmed.

SASAUG will also be taking an active part in the organisation of RISCOS 2000, the successor to last year's successful Epsom show.

SASAUG meets on the second Monday of the month at the hall of Horsham Methodist Church. Maps are available on the Web site (**http://www.poppyfields.net/sasaug/**) or by contacting the chairman on: jmsawer@argonet.co.uk or via tel: 01903 260666.

Pace licenses Acorn technologies

Alba is a familiar name in the budget end of the TV market. The brand is obviously looking to shake off its simplistic cheap and cheerful image with the announcement that it has licensed Acorn-derived NC technology from Pace Micro Technology.

Pace was the company that eventually ended up holding the rights to the left-over Acorn technologies once Element 14 had cherry picked the Acorn oak tree, to mix metaphors. Ultimately RISCOS Ltd has to answer to Pace as well.

The Alba deal includes technologies for building Internet-browsing capabilities into TVs or set-top boxes. These include the ANT-based Internet suite, which includes a HTML 3.2 Web browser, JavaScript 1.1 and 40-bit SSL secure server support. It also probably includes Acorn's technology for improving the appearance of on-screen graphics using a standard TV display.

Richard Nicoll, general manager at the Pace Cambridge Engineering centre commented: "This technology is an exciting development for Pace and Alba as it enables Internet content to be viewed through the television, bringing the Web browsing experience to a whole new group of non-PC owning consumers.

"Industry predictions show that by 2003 the growth of TV-based Internet access in the home will overtake that of the PC which we believe will drive the creation of more Web sites designed specifically for the TV and not just the PC. These Information Appliances are potentially the start of a new and interesting line of business for Pace."

The statement reads like an Acorn press release from three or four years ago. The only difference is that, now, the predictions of imminent mass take up of TV-based Internet browsing products are probably true.

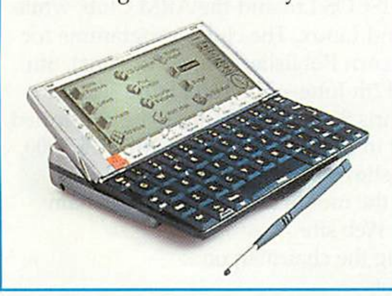


Psion extracting the michael?

The word is that Psion is preparing some pretty exciting new products based on cutting edge ARM technology. One prototype is apparently code-named 'Halla'.

Why is this name so significant? It's the surname of Brian Halla, the guy from National Semiconductor who has given the old x86 PC processor legacy a new lease of life in embedded applications.

NatSemi's x86-based Geode "PC on a chip" product has actually won some impressive support if the recent CeBIT show is any guide. However, Psion engineers know Geode is based on a tired old technology, which might have led them to name their new project in such a tongue-in-cheek way.



Flash upgrade for browsers

Flash is a plug-in for certain RISC OS Web browsers which makes them partially compatible with Web pages containing Macromedia Flash object content. If you have been stymied by the 'Get Shockwave' prompt while browsing a site, this will help you along.

Dutch author, Leo Smiers, does warn that his solution isn't perfect just yet: "Although we now have the capability to view flash files not all sites will allow us to enter because they test for other required features or do not detect the *Flash* plug-in."

Missing features include: sound support, morphing and some Flash 4 features. *Flash* is designed for browsers which use Acorn's plug-in format. It has been successfully tested with ANT's Fresco versions 2.02 and 2.13.

For those interested in the technical side, this *Flash* plug-in is a port of the "Flash Plug-in for Linux" which was developed by Olivier Debon and Fabrice Bellard. However, Leo should be your first port of call if you are experiencing any problems.

You can download *Flash 0.49b* from Leo's homepage at **http://people.a2000.nl/lsmiers**

DTP is on the move

Desktop Projects' Paul Walker has revealed that his company is moving premises. Tau Press, which publishes *Acorn User*, shared Desktop Projects' old premises until recently.

The new address is: 4 Clock Tower Close, Millgreen, Hyde, Cheshire, SK14 1RS. A new local call-rate phone number is 0845 458 0778.

Paul told *Acorn User* that the move to Hyde will coincide with an increased focus on Linux products and developments (see advert in April's issue), although traditional Desktop Projects supplies for RISC OS customers will continue to be available for the foreseeable future.



Boom goes the Internet – again

In the last month all hell has broken loose when it comes to the topic of 'un-metered' Internet access in the UK. The TeleWest cable TV operator had already taken the plunge earlier by offering all its phone customers 24 hour access to its Internet service without charging for the phone call. Callnet800, an ISP also offering phone services offered a similar 24 hours a day deal, expanding on the Localtel/Screaming.net offer of free Internet access at off-peak times.

But it was the giant AltaVista Internet search engine company which waded in and set the cat among the pigeons. AltaVista says it will offer free Internet dial-up access to UK Internet users later this year for a nominal annual charge. This prompted the UK's largest cable company, NTL, to announce a TeleWest-style deal.

BT, too, announced plans for un-metered access, though for a monthly fee. Freeserve announced similar plans a few days later. One pig in the poke has been AOL, though. AOL has been offering discounted Internet access for a monthly fee and they say that fully unmetered dial-up Internet access using the AltaVista model is financially unviable. We'll see.

However, more glittering Internet attractions are just around the corner. The catch-word is 'broadband.' Un-metered dial-up access to the Internet is very welcome, but it's still boring old modem technology working at a paltry maximum speed of 56 or 64K (ISDN) bits/second. At last, really fast always-on Internet access is coming to the UK. NTL says it will start rolling out its digital services beyond the trial phase starting in April.

Cable modem services should deliver up to 512K connections, though performance can degrade if everyone on your street decides to download huge files at the same time. BT is making noises about rolling out its DSL (digital subscriber line) broadband Internet services this year. These connections will provide up to 1Mbits/second and will be always on.

Meanwhile, the Luxembourg-based Europe Online service is planning to commence its satellite service before the end of the year. Already operating via Astra satellite transponders aimed at continental Europe, Europe Online provides 2Mbits download speeds for about £10 a month.

If you already have a BSkyB digital TV dish, all you will need for Europe Online's broadband Internet service is an appropriate personal computer interface.

All the recent publicity has been focused on cheap dial-up Internet access, but broadband services will eventually re-take the limelight.

WebChange2 easier to buy

Soft Rock Software's *WebChange2* is a tool written to aid those who prefer to design their web pages by hand. It enables quick and convenient repetitive changes to the local copy of a site. The new version 1.07 adds a very useful file insertion facility, similar to that offered by web servers supporting SSI.

This facility enables you to keep sections of your HTML, which might appear in more than one page, in a separate file, with WebChange inserting it in the appropriate pages when run. Therefore, to make a change to that section of HTML on all such pages, you now only change the separate file, and have *WebChange* reinsert it where necessary.

The full price of *WebChange2* is just £12. Full-price buyers get free updates and inclusion on a special mailing list. If £12 is too much of a gamble, it's also now available for a budget deal price of £4.50. For this price, you receive the current full version, but you won't be registered for free upgrades. Within three months of purchasing at the budget price, you can pay the price difference to be registered as a full user. For more information, check the **http://www.webchange.co.uk/** Web site or call 0870 7401759.

Acorn Southeast Show

John Stonier is currently organising the Acorn Southeast Show, which will take place on Saturday, 1st July 2000, at the 'The Alban Arena', St. Albans, Hertfordshire.

John says: "To reflect a strong hobbyist approach, I would very much like enthusiasts to play a part on the day of the show and have set aside a special area for this. I'm looking for people or user groups providing a non-commercial RISC OS related service, or who having something of interest to demonstrate on their computer.

"It would be an excellent opportunity to publicise yourself or your group to a large number of enthusiasts, at NO cost to you. If you're doing anything of interest with your Acorn computer and you'd like to demonstrate it, I'd like to hear from you!"

John can be contacted at: tel/fax: 01935 413170, or e-mail: acornshow @argonet.co.uk. The show Web site is at: **www.argonet.co.uk/acornshow**

The show opens at 10:00am and closes at 4:30pm on 1st July, 2000. It will cost £3 entrance, or £2 for ARM Club or Foundation members. Children under 16, accompanied by an adult, will be admitted free.



Sync or swim

Wouldn't it be nice if your palmtop, phone, laptop, in-car computer, desktop PC, and business networked PC all had access to each other's data, and kept all your e-mail, documents and work files up-to-date and synchronised all the time? You'd always be in contact wherever you are, even on the beach, with access to everything.

The SyncML Initiative has been founded by big industry players, including IBM, Lotus, Motorola, Nokia, Palm Inc., Psion and Starfish Software to develop a universal standard for data synchronisation. SyncML stands for Synchronisation Markup Language, which they hope is the Next Big Thing. No sign of Bill joining up so far.

SyncML is an XML-based protocol designed to standardise the way mobile and fixed data devices communicate and inter-exchange data. The SyncML Initiative Web site at **http://www.syncml.org/** explains that synchronisation requires transfer of data in both directions over different media and for different devices, while maintaining integrity and validity to all of these devices.

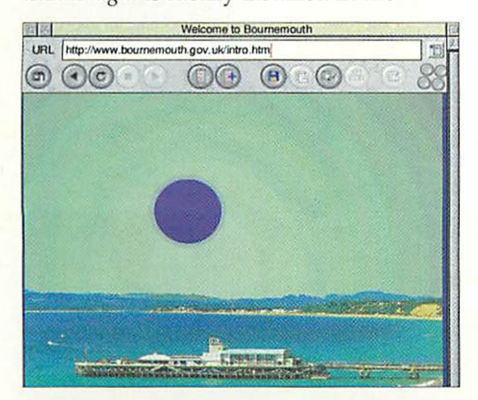
SyncML data has to be transferrable over Web page, e-mail and other wired transports, as well as new wireless protocols such as WAP and Bluetooth. This sounds like a pretty tall order if I want to read my e-mail on my phone, and also finish touching up that 24Mb TIFF of my latest product. But SyncML has built-in capability to deal with all types of data, including Blobs - binary large objects, and cope with the limited resources of some of the devices.

So while you're relaxing on the beach reading your e-mail after a swim, you'll probably never notice the Blob sliding up behind you.

Plugging the gap

Things are looking up for Acorn users who feel frustrated that *RISCOS* Internet applications are not keeping pace with the PC world. Two new freeware plug-ins for Acorn Web Browsers have been recently released.

Dave Ward offers his *!MidiPlugin* for *!Browse* users. The *Browse* MIDI plug-in works with either an add-on hardware MIDI Synthesiser card or one of the RISC OS software MIDI synthesisers, such as Expressive Software Projects' *!Synth*, to be found in the 'bundle' on the RISC OS 4 Installation CD. To actually play the MIDI file, Dave's plug-in uses Rob Smith's *Ethereal* module included in the archive. *!MidiPlugin* is ideally installed in the *!Boot.Resources* directory so that it is automatically seen by the RISCOS filer, and *!Synth* and its resource application *!SynthBank* must be already installed and running before viewing a MIDI-embedded page. You can download *!MidiPlugin* from **http://www. sparkplug.freeserve.co.uk/Acorn/ index.html**



Both *!Fresco* and *!Browse* users benefit from Leo Smiers' *!Flash* plug-in which now gives access to many Web sites previously denied to Acorn browsers. Many sites use *Macromedia Flash* for flashy animations that don't enhance content, but it is also often used for navigation; the D-Link Europe Web site at **http://www. dlink.co.uk/** cannot be entered without *Flash* capability.

Leo's *!Flash* plug-in for RISC OS is also best installed in *!Boot.Resources*, and there's one edit required in the mysterious MimeMap file so RISC OS can recognise a Shockwave-Flash object. The MimeMap text file is usually in *!Internet.Files*, or use the Filer's Find option to be safe. One other requirement is plenty of free memory; at least 4Mb will be required. Leo's installation notes are easy to follow, then look at **http://www. bournemouth.gov.uk/** to test it. Download *!Flash* from **http://people. a2000.nl/lsmiers/ flash/flash.html**

In brief

Speeding Fine

The Computing Central Bandwidth Speed Test page provides an interesting insight into why or whether your modem is doing you justice as you browse.

To take the speed test, you do need a Javascript browser, and when I used *ANT Fresco© 2.13*, it told me my ISDN line speed was 58.29999999999 9997 Kbps, with a transfer rate of just over 7KBytes per second. Rounding errors apart, that's not too bad for a 64Kbps connection.

WebsterXL couldn't agree about the quality of the site's JavaScript. You can judge for yourself at http://www. computingcentral.com/topics/ bandwidth/speedtest.asp

No barrier for ROUGOL

The RISC OS User Group of London (ROUGOL) boasts nearly a hundred members in and around the Capital and the South-east.

The committee members include many names familiar to Acorn users old and new. They aim to offer members the chance to see and hear about latest developments in the RISC OS World, and to maintain close links with RISCOS Ltd, other developers and interest groups.

Have a look at the ROUGOL Web site at http://www.jellybaby.net/rougol/ index.htm

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Contacting AU

David Dade:
comms@acornuser.com

The Netsafe fallacy

I've spoken before in this column about the shortcomings and advantages of the three main image formats for Web artwork, but I thought I'd devote time this month to the humble GIF image, and the often-misunderstood issue of the "netsafe" palette.

Our friend the GIF is an 8-bit file format, so a selection of no more than 256 colours may be used within the image, and it's often claimed that there is a specific set of only 216 "netsafe" colours that should be used for Web images. The reasoning behind this runs thus: when running in 256-colour screen modes under both Mac OS and Windows, both *Netscape* and *Internet Explorer* use the colours from this palette – although often referred to as the "Netscape browser-safe palette", it isn't only *Netscape* that uses it.

Since a selection of colours has to be made when saving GIFs, it makes sense that the ultimate colour choice enforced by a common browsing situation is worked in from the beginning, and thus standard-issue advice is to save GIFs in the netsafe palette to begin with.

However, to deal with JPEGs, which are able to use the full RGB range of colours, the browser manufacturers have needed to incorporate routines to convert off-limits colours to those that can be displayed, and by-and-large, those routines take a pretty good stab at the job.

The issue is made a little more complicated because of dithered images. When boiling an image down to a limited set of colours, many differences in tone can be simulated by creating a pattern of pixels using the colours available – this is most easily evident when mixing colours in a package such as *ArtWorks* if you're in a 256-colour screen mode. When converting a full-colour image to GIF, the image can be dithered to reduce the impact of the drop in colour levels – and this is what happens when a browser tries to display an image that contains non-usable colours in a low-colour screen mode.

But an image that's already dithered presents problems for display in those circumstances: the dithering pattern used in the image can't be removed, and any further dithering that would take place because of the new colour shift has to accommodate the existing pattern.

All this leaves us with four choices when preparing an image for use as a web-delivered GIF: to use the netsafe palette or to use a palette generated by analysing the colours within the image and choosing those which fit most closely, and within either of those, whether or not to dither the image. I've taken a sample image (Figure I), and applied the four techniques to it. In *Photodesk*, this is achieved by opening the Channels window from the image, and choosing the *Change image mode, Indexed* menu option (Figure II). There are RISC OS palette files of the netsafe colour range available, and by installing these in *Photodesk*, an image can easily be converted to this palette from here. The *Spread colour errors* option in the dialogue box turns dithering on and off, and the *Analyse* option within the *Colour table setup* portion of the window is used to calculate a palette from the colours contained in the image itself.

As you can see, using the netsafe palette without dithering gives



Figure I: Original image, full colour

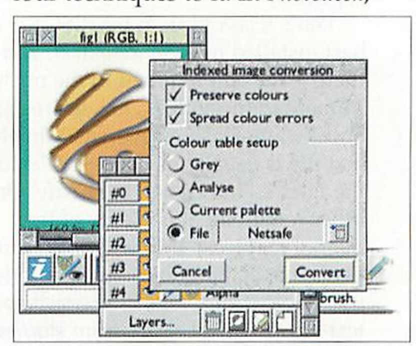


Figure II: Making the change in Photodesk

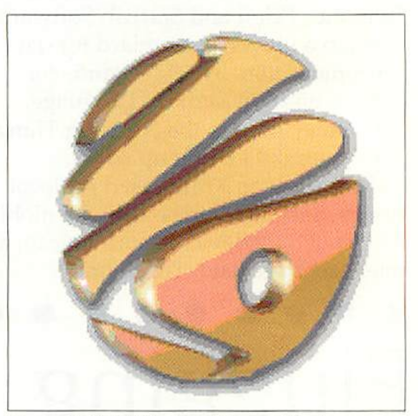


Figure III: GIF, Netsafe palette, no dithering



Figure IV: GIF, Netsafe palette, dithered

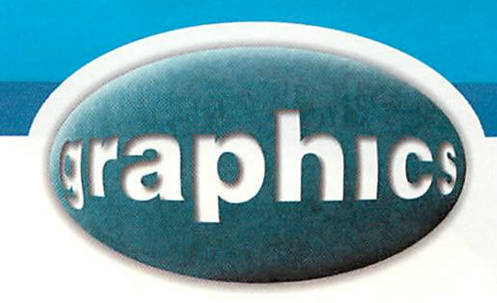



Figure V: GIF, Analysed palette, no dithering

disastrous results (Figure III), but the dithered option is far more acceptable (Figure IV). Choosing a palette which is generated by analysing the colours used within the image is noticeably better still (Figure V), with the dithered option on this by a hair's breadth giving the best results overall (Figure VI).

And this is for Windows and Mac OS. Under RISC OS, the operating system takes care of the colours available in 256-colour screen modes, which in many cases are different from the colours specified by the netsafe palette. Unix systems, running *Netscape* under X Windows, may have different results still, in that quite often, even those 216 colours may not be accessible. And then there are 16-colour screen modes, but Web browsing under those conditions is going to be a dismal experience in regard to image quality whatever you do, so we won't worry about that.

If the browsers' internal colour conversion routines are up to the job of re-converting the GIF's analysed palette down to the set of colours which are available, is there any point in fitting the netsafe palette to the image right from the start?

The only way to tell, of course, is to examine the results of the four methods using a browser in a 256-colour screen mode – in this case, *Netscape 4* under Windows.


Figure VI: GIF, Analysed palette, dithered

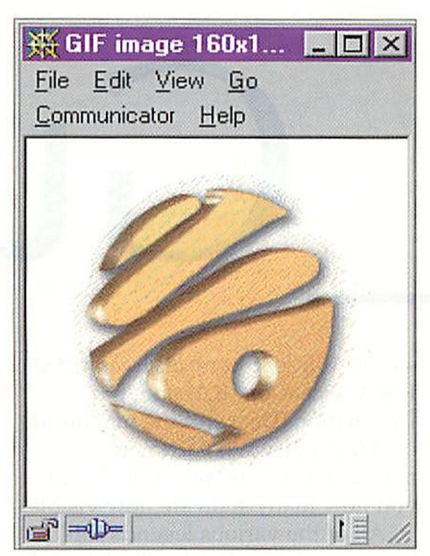


Figure VII: Netscape screenshot, Netsafe palette, dithered

Nothing short of the miraculous could save the image resulting from the netsafe palette with no dithering, so there's little point in trying this (although I did, and there was indeed no miracle). Figure VII, however, demonstrates the netsafe palette in precisely the circumstances it was designed for, and the results are indistinguishable from that same GIF image viewed in a high-colour mode.

The interesting results come from loading the analysed-palette GIFs into Netscape in these circumstances. Without dithering, the analysed palette (Figure VIII) actually gives better results than using the netsafe palette – and, of course, gives even better results in screen modes with a more colours. The analysed palette with dithering, on the other hand, is slightly worse than the netsafe option, largely due to the conflicting patterns.

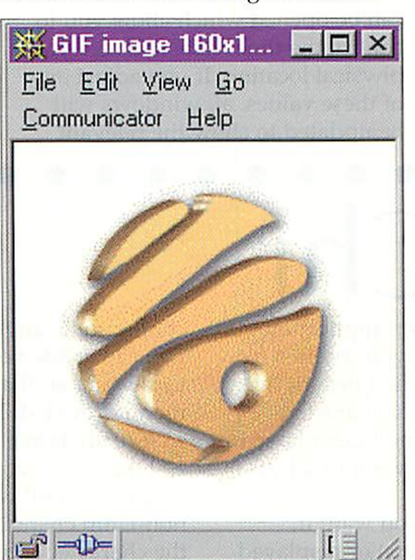


Figure VIII: Netscape screenshot, analysed palette, no dithering

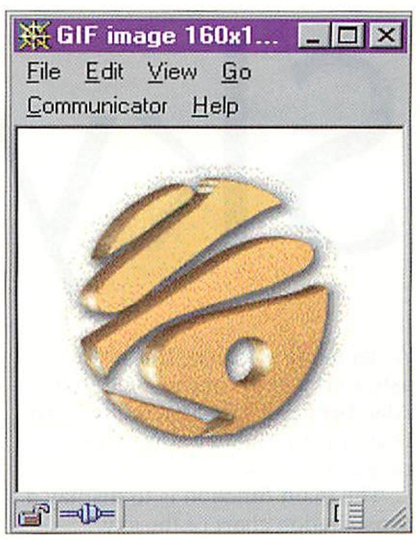


Figure IX: Netscape screenshot, analysed palette, dithered

This last option provides us with a judgement call: does the slightly improved quality of the dithered, analysed-palette image in high-colour modes over the non-dithered version override the greater drop in quality between the two in 256-colour modes? I'd venture that it doesn't: the difference between Figures V and VI is minimal, whereas Figure VIII is the clear winner in the 256-colour stakes, and allows for a variety of other dithering regimes, such as that used by RISC OS.

The upshot is that using the netsafe palette isn't necessarily a good idea: in fact, it can give worse results than leaving the browser to get on with the task of dithering an image down to the colours it has available, and will always give worse results in high-colour screen modes.

The definitive discussion of this issue is available from Alan Flavell's web site, at: **http://ppewww.ph.gla.ac.uk/~flavell/www/palette.html** – which contains an acknowledgement to our very own David Matthewman! **END**

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Sky_Guide

As its name suggests, this is an astronomy application. Written by Alan Senior, it's designed to be easy to use, yet provide a comprehensive range of features.

The main function is to display a constellation chart of the sky showing the locations of stars, planets and various other astronomical objects. There are four available ways of displaying the data:

- Celestial sphere
- Equatorial view
- Moon phase
- Simple orrery

Sky_Guide's database contains over 9000 stars and Messier objects down to 7th magnitude (visible with a good pair of binoculars), 88 constellations and, of course, the Solar System planets. The main celestial sphere window can be viewed at any of four magnification factors and two RISC OS window sizes. A large, zoom, window allows you to pinpoint individual objects in order to glean further information from an 'info' window.

As you can see from the accompanying screenshot, there is a handy toolbar at the top of the display window which lets you toggle various options on and off. You can move around the sky via simple RISC OS controls to adjust the Right Ascension (RA) and Declination (Dec) and the magnitude of stars to view. At each new magnitude a stars indicator shows you how many stars are now visible.

All of the various legends can be turned on and off and will ultimately determine how much data is displayed, such as star names, grid lines, messier objects, constellations and so on.

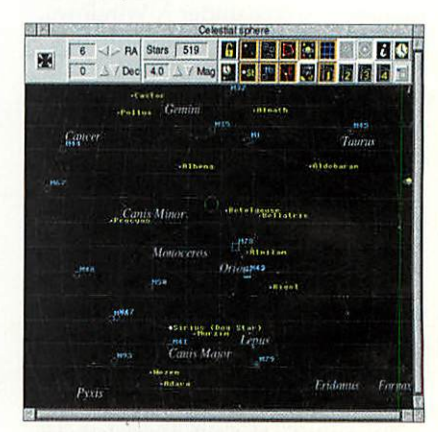
A menu on the iconbar icon allows you to select various alternative display functions such as an Equatorial view, which shows the strip of sky which lies over the Earth's equator. This provides a wide angle view of the sky and shows where the planets tend to lie.

The separate Moon window gives a quick and handy guide to the moon's current location, not only showing the relative position, age, phase, rise and setting times but also gives a clear graphical depiction of the moon – as you would view it from your window. Lastly, the Orrery window shows a plan view of the solar system that you can zoom into and out of.

Two additional control windows can be opened which allow you to control the time/date and also your physical location. If you adjust any of these values, all windows will be updated to show the relevant views. The moon's position will change slightly as your location on Earth changes, as the program allows for parallax.

In all, it's a very nice little application which is an essential addition to the astronomy software collection for any budding astronomers out there, or for schools doing science projects. It should work on any version of RISC OS from 2 upwards and any machine with at least 2Mb of RAM. However, some calculations can take a few moments so users with faster machines will benefit.

Sky_Guide is available to download from Alan's Web site at **http://freespace.virgin.net/alan.senior/comlink/sky.htm**



Display showing magnitude 4 objects – which should be visible with the naked eye on a clear night

CustomChr

If like me, you've ever found Acorn's *!Chars* application to be rather restrictive, then *CustomChr* is for you. Written by Jonathan Rawle, it sits on the iconbar (the first benefit over *!Chars*) and lets you select various groups of characters from a handy menu. This means that you no longer have to display the entire character set if you only want to select from a small range of foreign characters.

Of course, the whole set is available if you want it, either arranged in numeric order (like *!Chars*) or displayed in the 'QWERTY' keyboard arrangement. A whole host of foreign language subsets can be selected, but this is entirely configurable anyway. With the help of a plain text editor you can create your own sets of characters to store within *CustomChr* so that you can add your own entries to the menu provided. By deleting files, you can remove entries so it really is as flexible as you want it.

Like *!Chars* you can select which font you want to use, which is useful when you want to choose Dingbats or other non-Latin characters. Lastly, the status can be saved so that the character subset and font will be kept for the next time you load it. Download a copy from **http://www.argonet.co.uk/users/rawle/jr/** and you'll probably never use *!Chars* again.



Coeden

Coeden is a simple yet effective application by Barry Wickett for displaying a graphical view of your disc directory structure. Use is as easy as you can get. Just load the application onto the iconbar and either drag a directory onto it, or drag the iconbar icon into a directory. The latter is useful if you wish to map out the root directory of one of your drives

Coeden can calculate its tree diagram either single or multi-tasking so that your machine doesn't become inoperative when you scan large hard discs – and I'd certainly recommend using the multi-tasking option if you have loads of files on your disc like me.

Once you've told it what directory you want to display, it will interactively build up a graphical display of the tree structure of all files inside it. A very handy little utility if you want a visual display of the files on your discs. *Coeden* is available to download from **http://www.chortle.demon.co.uk/software.html**

```
ADFS::Orac.$
$              [illegible]49557K
 !Boot          37422K
  !Boot          554
  !Help          126
  !Run           292
  !Sprites       1684
  !Sprites22     3268
  AsmLib         38K
   DivMod        2035
   SWINames      36K
  Choices        882K
   !ZapUser      220K
    !Boot        187
    !Help        1146
    !Run         268
    !Sprites     996
    !Sprites22   1916
    Config       37K
     !Config     2960
     !ReadMe     1418
     !ZapBoot    690
     !ZapRun     1685
     ClickSend   1280
     Country     117
     Keys        7834
      UK         7834
     Menus       19K
      UK         19K
     Settings    1402
     TMFs        1046
      Asm        59
      Assembler  121
      BASIC      58
      BasTxt     45
      C          131
      C++        128
      Code       55
      ForZap     56
      Java       116
      Perl       98
      StrongZap  58
      Text       121
     TypesHigh   288
```

Squish

Squish is another nice little utility I discovered while checking out Barry's Web site. This time it's a utility for performing linear distortions, or stretching, on sprites. All you have to do is load *Squish* and drag your favourite sprite to it's icon. *Squish* will then display the sprite for you and place six little drag boxes at the edge of the image – one on each corner and one mid-point of each side.

By dragging the various points around you can change the slope of the sides in order to create a slanted parallelogram. A menu provides additional options such as zooming and rotating the image. A linear option will lock opposite controls so that the image will remain symmetrical when you reposition a corner.

Once you've decided on the new shape. A 'do it' option will distort the sprite so that it fills the newly defined area.

You can have fun playing around with different images and indeed, if you snapshot some text in *!Draw* you could obtain various effects to make posters and invitations more eye catching.



Before...



...and after

EuroDict

If you're planning a holiday abroad in Europe, this is the ideal application for you to brush up on your vocabulary. It's a simple word finder for translating English words to or from their European counterparts. Danish and Finnish are supplied with the freeware version available to download from **http://homepages.which. net/~philip.murray-pearce/progs.htm**

A number of different dictionaries are available, covering most European languages – and some not so common ones such as Indonesian, Gaelic, Gothic and Old English.

Again it's another simple application to use. Select the language you wish to use and toggle whether you want to convert to/from English. You can then enter a target word in order to be provided with a list of translated versions. If the word entered is not in the dictionary, the nearest alternative is given.

You can skip forwards and backwards either individual words or bigger steps for faster browsing through the dictionary. Dictionaries can be exported as plain text files and an optional 'grammar' toggle control will include any grammatical information associated with the word entered.

EuroDict is written by Philip Murray-Pearce and not only serves as a quick reference for language conversion but may even help school homework as well.

.Deep impact

Ian Giblin analyses explosions

Somewhere between the orbits of Mars and Jupiter, in the region of space known as the Main Belt, orbits asteroid "Giblin". Formerly known as "1977 AW2", this asteroid was named after the author in July 1999 – a great honour – in recognition of contributions made to asteroid and space science.

These contributions were made almost entirely using computers running RISC OS. From a floppy-only Archimedes 310 in 1990 to a modern 258Mb Risc PC 233T "Web Wizard", these machines have been central to a project involving image processing and data analysis.

Over the past few decades, impact experiments designed to simulate asteroidal collisions have been the subject of a number of research programmes around the world, often involving international collaboration. Scientists have used launchers including rifles, large air guns, explosives and hypervelocity "light gas guns" to nudge, chip, smash and pulverise targets of different types.

One such experimental programme was being organised by a colourful Italian, Professor Giuseppe Martelli, at the University of Sussex while I was studying for my degree in 1990. Professor Martelli's group was called the "Space and Plasma Physics Group", which sounded pretty cool. Martelli needed a scientist who could program computers. Luckily for me I was the only applicant – luckily for the group, I was also pretty competent at programming the Acorn computers we had at Sussex.

Tell me everything...

Space Science? Blowing stuff up? It was a boy's dream. After the initial excitement it became clear that this project would be difficult to do well. The Sussex group had carried out experiments in 1989 at an open-air arena in Tuscany, using a contact charge (a piece of plastic explosive) to achieve a very high level of fragmentation of cement targets.

The impact/explosion was filmed using a 16mm high-speed cine camera. After each shot all the fragments were collected and weighed before some very dedicated project students attempted to rebuild the original 10kg cement targets.

No analysis of the films had been attempted because it was too large a task for a one-term project student. No software existed for the task either but I could see there was a wealth of data here waiting to be collected. I'd also spent many afternoons writing games and Mandelbrot Set plotting programs on the Archimedes 310s we had in the teaching labs, so I could see how to do it. Thanks to a proposal by Prof. Martelli and the group, we were awarded funding for a project which ultimately became my Ph.D.

Professor Martelli always began our meetings with the same line: "So – tell me everything." It may sound like a lot to ask, but it nicely sums up the thinking behind the project. Given film of an impact experiment, a digitiser, a computer and someone to program it, it should be possible to extract almost all the data you could want from the film:

Fragment ejection angles, velocities, rotation rates, sizes, shapes... all of these are interesting to planetary scientists; laboratory experiments provide a unique opportunity to study fragmentation and collisions of this kind. The only limiting factors are the quality of the film, the determination of the programmer and researcher – and the time available.

The cine film was running at 700

About the Author

Dr Ian Giblin is 31 years old and lives with his wife in Queens, New York. He works for a financial management firm on Wall Street, developing mathematical software on a Risc PC and ultimately running it on PCs. Ian devotes about a day a week to planetary science. He has written a number of freeware RISC OS applications and (with Paddy Spencer) wrote *SmartCD+* which is sold by the ARM Club.

frames/sec during the four 1989 experiments, and we needed at least a second of footage to fully analyse each of the four shots. This meant digitising around 3000 frames. We transferred the film to video by projecting it in our laboratory and videotaping it using a monochrome CCD camera.

Then we bought a Watford Electronics 6-bit mono video digitizer and put it in the Archimedes 440/1 which had just been delivered. The documentation with the Watford card was excellent and allowed me to write the required ARM code to grab video frames and save them sequentially. Unfortunately we found that the card could only grab every 8th frame or so – it just wasn't fast enough to catch each one.

Peter Smith, a Research Fellow and excellent technician, came up with some custom electronics which allowed me to first mark the audio track of the VHS tape with a pulse, then use the pulse as a trigger while counting video frames. By marking the tape some time ahead of the actual impact we had a reference point. The custom electronics board was then connected to an Acorn I/O card and monitored in an ARM code routine which supervised the image grabbing.

Using this system it only required a small number of rewind/replay cycles to grab all the video frames. Efficiently decompressing the Watford files and displaying the images required some more hand-optimised ARM code but it wasn't long before this was silky smooth. It was already clear to us at this point that the Acorn systems were ideal for the project – easy BASIC programming and prototyping, great firmware libraries like the OS_Sprite routines, and a memory model which was perfect for single-tasking applications like this requiring fast video.

The first scientific program was called *HV_1*, for "Hypervelocity Studies Program 1". Not very imaginative, I admit. There was only one camera to worry about, so (RISC OS 2) Mode 15 was perfect for the 640 x 256 pixel scaled images in single-tasking mode. We used the composite video-out on the Archimedes, connected to a monochrome monitor. This allowed us to use carefully selected colours to represent grey levels on the screen (we actually optimised the palette using a digital oscilloscope to monitor a 64-level grey test card). Left and right mouse buttons stepped through images and the centre button was used for marking the position of a tracked fragment in each frame.

HV_1 soon evolved into *HV_2* with a major re-write including the first of many ARM code improvements and the addition of the simple data collection capabilities. By measuring the target size on the screen and calculating a scaling between pixels and real-world millimetres, I extracted the 2D velocity of a large number of fragments from the 1989 image set. Figure IIb shows some of the trajectories from one shot which was analysed by myself and a couple of undergraduate project students.

Utilising some of the built-in OS_Sprite routines, I also added a function which played all the frames sequentially but cut out the area around a particular fragment and kept it in memory (the position of the fragment in each frame is either indicated by the user or based upon interpolation). Then it could be replayed at a useful frame rate in the middle of the screen – the fragment would appear stationary as the background moved. This allowed us to measure both the rotation rate and the size of the fragment very easily, and was a fundamental improvement.

In 1993 I bought an A5000 and added a *ColourBurst* Graphics Card from State Machine. This allowed 256 levels of grey and bigger screen modes, pre-empting the hardware improvements which would become available in the Risc PC. We were then able to set aside the monochrome video display and use a regular high res multiscan monitor.



Figure IIa: A target sphere (20 cm across) before detonation of the contact charge

Aster-whats?

Asteroids – also known as minor planets – are small bodies, smaller than the primary planets, orbiting the Sun. Most of their orbits lie in a region called simply the Main Belt, between the orbits of Mars and Jupiter, the fourth and fifth planets. The largest asteroid is 1 Ceres with a diameter of 1025 km (640 miles), but this is the leader by a wide margin with the next runner up, 2 Pallas, coming in at 583 km (362 miles).

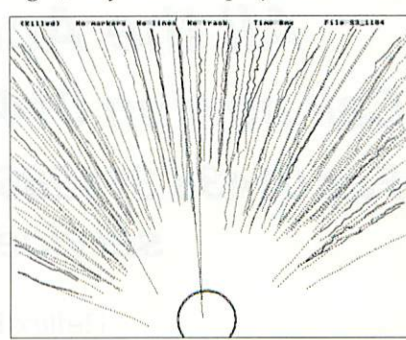
The numbers preceding the names denote the order in which these asteroids were discovered, not their position in the size sequence, and the numbers get jumbled up quite fast. The fifth largest, for example, has the designation 704 Interamnia. Asteroids are mostly rocky but with metal and other components. A small number appear to be made of almost solid iron.

While I'm on the subject, they are not at all spiky like the one in "Armageddon". No way. They're actually quite smooth on the surface, at least looking on a global scale.


Figure I: Asteroid 243 Ida and its relatively tiny satellite, Dactyl. The longest axis of Ida measures approximately 56 km (35 miles) and the almost spherical satellite Dactyl has a diameter of only about 1.5 km (1 mile). The distance between the two was approximately 100 km (65 miles) when this picture was taken by the Galileo space probe in 1994. Photo courtesy NASA.

The next dimension

The trouble with *HV_2* and the 1989 single-camera system was that the measured velocities were just not right; they were 2D projections of 3D


Figure IIb: Trajectories of fragments, after impact, from the experiment in Fig. IIa

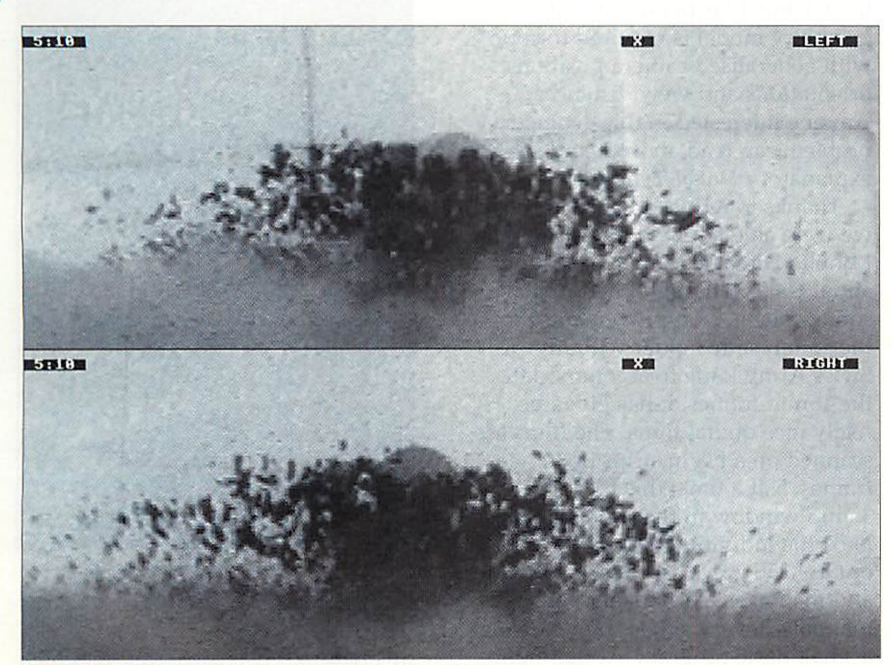


Figure IIIa: Twin-camera analysis with HV_3. The two views are synchronised but 60 degrees apart in viewing direction

velocities. Conceivably a fragment coming toward the camera might appear to hardly move at all when it was really a very fast fragment. Naturally we wanted to be able to extract true 3D velocities. The image quality in these films was also a bit shaky, so I was glad to have the opportunity to organise an experimental run along better lines in 1992.

In these experiments we used two 16mm cine cameras at a mutual angle of 60 degrees to give a stereo view. The cameras were equidistant from each other and the target so that they formed an equilateral triangle. This arrangement was carefully chosen to allow us to estimate the true 3D velocities of the fragments without getting too bogged down in the geometry. We were also able to use a professional video lab to transfer the 16mm film onto VHS tape. Expensive, but well worth it in terms of image quality. Then there were twice as many frames to digitize for each shot (because there were two cameras) but apart from the obligatory hard disc upgrade the system worked nicely, still using the Watford card and the Acorn I/O podule.

I rewrote much of the code to allow us to use the new twin-camera arrangement effectively and the program became *HV_3* (the "3" denoting both the revision and the 3D analysis) and this software is essentially what I use today for data collection. The screen is split horizontally (so half of each frame is visible – see Figure III) and the middle mouse button allows up/down scrolling when not tracking a fragment. This looks really nice – it's so smooth – but the cursor keys still work just as well.

There are something like 100 functions available via the keyboard: using combinations of the Control, Shift and Alt keys to add more options. The video redraw and a few other elements are written in ARM code, now very well optimised, with the BASIC code providing graphical overlays and veneer to the OS_Sprite routines where necessary.

Since buying my first Risc PC, with 64+2Mb RAM, I have developed a simple cache management system which creates a Dynamic Area of maximum size after Basic has started, and uses this for storing frames. This has made the video replay real-time once the images have been cached. A typical analysis session, where I'm scrolling the film back and forth to get a good feel for the fragment paths, might require 10,000 separate frame-load calls, so loading the first 100 frames slowly is no hardship.

My latest Risc PC from Castle came with 256+2 Mb RAM but I immediately evened out the memory between the two machines, so each one has 160+2 MB. This is enough to cache an entire film sequence. Under RISC OS 4, which allows WimpSlots bigger than 28 MB, the dynamic area system is no longer required but I have kept it for backward compatibility.

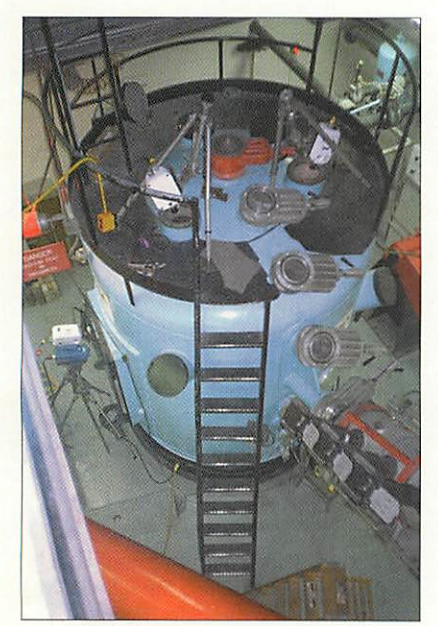
The 1992 experiments – the first analysed using *HV_3* – are the most completely studied so far. In a total of seven experiments, more than 500 fragments were analysed. The fragment rotation rate is measurable (correctly) in any 2D view, so by measuring the rates of many fragments in both views it was possible to automatically match some trajectories. Once the trajectories have been constructed in 3D the velocities can be measured (and corrected for gravity if necessary) before being exported to a program called *!Plot3D* for a simple 3D rotating view. This is hopefully included on the CD-ROM this month; see the help file and examples.

The experiments in 1989 and 1992 were all open-air runs using contact explosive charges to simulate an impact. Although Prof. Martelli died shortly after I finished my Ph.D. in 1994, the analysis continued through a two year European Space Agency post-doctoral fellowship during which I worked in Pisa, Italy – I bought a new Risc PC and took that with me. To date ten scientific papers have been published on the 1989 and 1992 experiments combined.

Candid camera

Three new sets of experiments have been done recently, all at the NASA Ames Vertical Gun Range (AVGR) in California, where I have worked with teams from Turin (Italy) and Tucson (Arizona, USA). In 1996 we


Figure IV: NASA Ames Vertical Gun Range, looking down from the second floor, along the gun barrel. The blue cylinder is the target chamber and the red Y is the gun mount, which can be angled from horizontal to vertical


Figure V: Close up of AVGR target chamber, showing all four cameras and the gun barrel coming in from the bottom right

used a variety of guns to shoot small cement targets (10 cm diameter) in the vacuum chamber shown in Figures IV and V.

Since then we have done more than 60 new experiments shooting icy targets. These targets are designed to simulate objects in the Kuiper Belt, a region beyond the orbit of Pluto which is believed to be a source of comets. Not much analysis has been done so far, suffice to say that the software is the same regardless of target material.

Figure V shows a close-up of the vacuum tank; you'll see there are three (white) cine cameras and one (blue) high speed video camera. The camera positions just correspond to the available windows in the tank – a lot less convenient than in the previous ('89 and '92) experiments.

With the AVGR tests the 3D analysis became much more complex. Firstly, it was almost impossible to accurately measure the camera positions on site. Secondly, the cameras on top of the tank were randomly oriented, just being attached upside-down beneath their tripods. The two cameras on top of the tank were, in theory, the stereo pair (equivalent to the two cameras in '92), but a far more elaborate geometry model is required to cope with generalised camera positions, orientations and view distances. Anyone interested in this geometry problem can read about it and see an explanatory *DrawFile* on the CD.


Figure VI: Three-camera display in HV_3

Thanks to reduced hardware costs we were able to buy a film scanner: a Minolta Dimage Scan Dual costing about £500. Although I had to make some – ahem – "improvements" to the 35mm slide holder with my Swiss Army knife to accommodate the 16mm frames, it has given us really nice digital films. The films are scanned on a PC in strips of 30 frames, 5 at a time; this fills one 35mm window in the slide loader. Next the individual frames are cut out as "256 greys" sprites in software and their exact corners marked manually (every single frame!) using a small Basic program. At that point the images are ready to be loaded into *HV_3* for fragment tracking.

The video redraw is optimised for a given screen mode but you can change mode within the program and the ARM code is dynamically recompiled to fit your screen, allowing resolutions from 640x480 up to 1280x1024. The highest resolution allows a synchronised three-camera display as shown in figure VI.

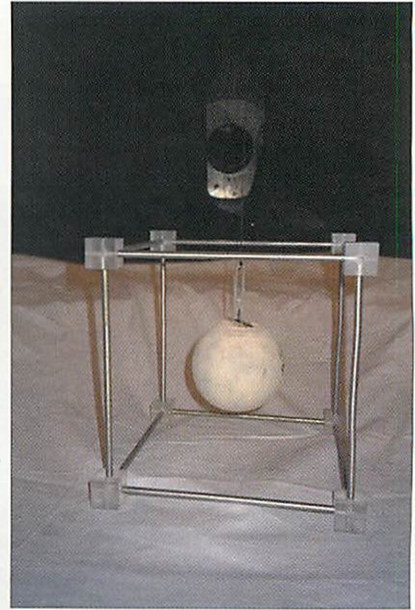
The triple view can sometimes be useful to see what's happening underneath the target but beyond that it is rather difficult to analyse. (Ask any three-eyed animal!)

Where am I?

I mentioned that we didn't know the exact camera positions in the NASA AVGR runs; the camera positions can in fact be calculated after the fact from a reference image as in Figure VII, where a cube of precisely known dimensions was filmed for a few frames.

This technique, which uses successive numerical approximations, is referred to as "view correlation". It is an accurate way to find the camera position from a known image. I developed a new program called *!ViewCorr* in C, to work out all camera positions and orientations. It has a proper application shell but really just opens a Task window.

One further application is required to extract the 3D information we want. This is by far the most computationally demanding of all the software; for this reason it is written in C and then run on a PC. The source code and a RISC OS executable reside in the application shell but this is primarily for development and testing. A small Obey file copies the source code to one of my PCs, then I have to switch to the machine and run GCC to compile it for DOS. This aside, the functionality of the current complete system is really wonderful.


Figure VII: Reference cube; the extent to which the cube is distorted tells you the distance it is from the camera

After tracking a large number of fragments in two views, the 2D tracks can be saved and imported into a program called *HV3DX* (a sort of acronym for HyperVelocity 3D eXtraction). This program will now automatically match trajectories and tell you which fragment in camera one corresponds to a certain fragment in camera two. It does this by trying all tracks with all others and minimising the average positional error. This program is not quite finished yet but promises to be the "holy grail" of velocity studies – systematic analysis of fragment trajectories from any two cameras in any position and orientation. And without the headache.

The instrumentation and software described here represent the absolute state of the art in experimental science of this kind. Now all I need is some five-day weekends to analyse the rest of those films...

Most of the software used in this project should be on the CD for you to take a look at, along with a selection of Replay and MPEG films from different experiments. Please take a look at these movies because they give a far better feel for this project than any still images. END

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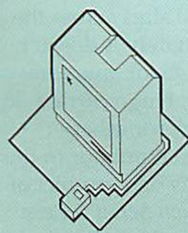
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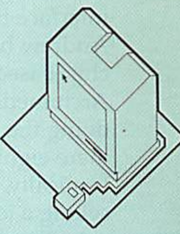
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Whatever happened to... Hugo Fiennes?

Alasdair makes some discreet enquiries

To say that Hugo Fiennes was an important figure in the Acorn market would be a gross understatement. Although still only 29 years old, he has numerous well known software titles in his repertoire including *ArcTerm*, the original sound tracker player and the IMAP client for ANT to name but a few. Today, Hugo is in charge of hardware development at Empeg (pronounced just 'mpeg'), a company which he co-founded in July 1998 to produce computer audio related products centred around the ARM chipset.

Although Hugo now lives and works in the "Silicon Fen" that is Cambridge, he was brought up in Somerset and attended university in Warwick before moving into the Acorn heartland. His first company, The Serial Port, was started in 1987 while Hugo was still at college to sell the software he had worked on in his spare time. Most of this was comms related, hence the name.

During these early years, the Serial Port produced numerous well-known and essential products including *ArcTerm6*, *Investigator* and *Disc Copier* on the commercial side as well as a few graphical demos and other PD applications. The original RISC OS tracker player also came from the hand of Fiennes, partly as a spin-off from the work done on graphical demos. This module has subsequently been used to give music to hundreds of games and demos.

Once out of college and wondering what to do next, Hugo formed QD Enterprises with school friend Andrew Foyle. QD used the Serial Port name and continued to produce products for the Archimedes series computers. Hardware-wise, they produced more or less everything under the sun from a simple Joystick interface up to SCSI cards. Andrew subsequently went on to start up Argonet who are now doing very well out of the mobile communications boom.

The Serial Port were responsible for successfully tidying up and marketing a parallel port joystick interface by Andrew Fedonczuk. Andrew had come to them with a chip-based solution but, in true Archimedes style, a simpler way of doing the same job as found using a mere eight diodes on a small PCB. Ironically, the Serial Port ended up selling a joystick interface which actually used the parallel port. After leaving QD in 1992, Hugo completed a degree in computer systems engineering between 1994 and '97 at Warwick University. During this time, he and Rob (who is customer services manager for Empeg) produced Chromaburst. Those of you with good memories will recall a feature on the system which initially used a network of Archimedes machines to control a Quasar laser gun game.



The system devised by Hugo and Rob was incredibly advanced for its time with such niceties as computer-interfaced lighting control and even ID tag chips which clipped into the bottom of guns to identify the player. However, in the end, it turned out that the first incarnation of the Chromaburst system did far more than the market wanted: it was "a bit over the top" to use Hugo's own words. As a result, it was cut down and re-written for the PCs that were already installed in many venues.

During the interview, Hugo added: "We had to do development while Quasar was shut which was between 10pm and 10am so they used to lock us in there at night because we couldn't have keys for the alarms. We also got free plays on some of the video games so it was quite fun." The system is still in use today on around 50 sites across the world but unfortunately it doesn't include any RISC OS kit anymore.

After university, Hugo carried on doing contract work for other people; the terminal emulator in the *ANT Internet Suite* is one product of this. Eagle-eyed *Psion Series 5/Revo* owners may have noticed that



Damn it, what's the name of that Linux penguin?

portions of the e-mail program are credited to ANT as well. This is because the IMAP mail client software was crafted by Hugo's fair hand while working for ANT.

Empeg Ltd. is Hugo's latest venture. The company's main product is Empeg Car, an in-car player for MP3 music files which slots into a standard dashboard stereo mounting. (For more information on the MP3 compressed audio format, see the March issue.)

As with all good ideas, the player has grown from a system put together by Hugo for his own use; "it worked so well and everyone wanted one so I decided to start a company to actually make them" he commented.

So Empeg was founded in July '98 with partner Steve, an accountant by trade who takes care of the admin side of the business. Seven people are now employed full time at the modern office unit just off the Newmarket Road in Cambridge.

Empeg Car uses a StrongARM SA110 chip running Linux to playback audio files from a built-in laptop hard drive. Other features of the unit, which has been on sale since August of last year, include an illuminated front panel display with some nice visualisation effects to accompany the music.

With the capacity to store up to 10,000 tracks on the internal hard drive, it's a good job that extensive search facilities are also offered from the unit. Gone are the days of bulky CD changers in the boot, this box can offer far more storage but only at a price tag to match. Once larger scale production starts later on in the year, entry level players are expected to retail for around £900.

Extensive interfacing support is provided for actually getting the songs onto the unit; serial port, ethernet and also USB connections are provided.

Currently, Linux and Windows software is offered with Mac support on the way. Software for RISC OS should also be possible soon once Empeg release the source code to the Linux command line suite. In theory, this could be re-compiled under RISC OS and a suitable front-end bolted on.

The main reason for choosing Linux as the operating system for the in-car MP3 player was simply that Hugo fell in love with the OS after realising how easy it was to develop under and implement on customised hardware. For his final year project at Warwick, Hugo had put together a single-board webcam solution. This used the chip which was in the original Series 5 machines from Psion and included a colour QuickCam for image capture along with ethernet and parallel ports.

While still in Leamington Spa, waiting for his girlfriend to finish her course, Hugo toyed with Linux and found that it took only three days to get it working in place of the custom OS which his WebCam board had originally used. It is truly a "low hassle OS" as Hugo remarked.

On the day of my visit, we settled down in a small mock living room. These should be a feature of every office if you ask me, a pinball table, TV, stereo and a Playstation as well as the obligatory MP3 player were all spotted. However, I was unable to blag a go on the pinball machine: "unfortunately it has some problem with the flippers because it's got a dodgy transformer. Last time we plugged it in, it tripped out the whole building which wasn't very nice with all the machines turned on here." commented Hugo. Now I realise why there's so many UPS boxes protecting the servers.

Hugo has, by no means, given up hope for the RISC OS market. When quizzed on its future, he replied: "RISC OS needs to get onto other hardware and not just keep on making Acorn clones. ... it's just getting it away from the I/O and the VIDC and that shouldn't be too hard to be honest. Once you've done that, you've got the Corel NetWinder, the NetBook or whatever, it all becomes completely possible and it could be a lot of fun."

He is also keen to point out that the road ahead isn't going to be easy riding: "You have to be careful that you have new hardware though. The Amiga market is still going along but you have lots of people who are selling just accelerator boards. So you have your Amiga which has the custom chips in it which no one else can make then you have about 50 million people who make accelerator boards to make it a PowerPC.

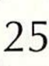
"The point is that because they couldn't get away from the custom chips, you still have a very old Amiga with lots of stuff plugged into it. With Acorn though, the ARM chip hasn't disappeared so as long as you keep it on up-to-date hardware, there's no reason for it to die".

There's also no reason why a hardware-independent version of RISC OS shouldn't work on Empeg's products. The advantages of this would be minimal though but it would be nice to have a mini RISC OS machine in your car dash.

Empeg are a company we'll be hearing more from before the year's out. Currently, only 400 of the in-car players have been produced but once the mark II boards go on sale, we'll all be able to say "I know the guy who built that". END

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Fax:	01223 576 124
E-mail:	info@empeg.com
Web:	http://www.empeg.com/



Expanding Ovatio

Last month, I showed you the basic anatomy of an applet (Figure I) and its script file. This month, I'm going to expand on this to produce something (hopefully) useful and, in the process, to show how an applet works in real life. The applet I'm going to use is called *TextPal* and it produces a palette that changes certain text features whose controls are currently scattered over various *OvPro* dialogues.

When trying to get a layout right, it's rather useful to be able to twiddle settings simply, so I wrote this applet to allow me to do this. The listing of the applet's code is shown, so I can refer to specific parts without having snippets throughout the text. However, it isn't a complete listing – I've omitted a few parts that aren't important to points in the article and also the comments.

The full listing is, naturally, included in the applet itself, which is available from the *Acorn User* Web site and future CDs. Because this applet is partly intended to be a tutorial, the real code is fully commented. Most applets include some comments but most aren't full enough to learn from easily; hopefully, this one will be.

The text palette

Figure II shows the text palette window that's produced by this applet. Windows can be created using any normal template editor, such as *TemplEd* or *WinEd*. The template file should be saved in the *AResources* directory of the applet, from where *OvPro* will load it on starting. The palette will control the leading, vertical shift and tracking in steps of 10 units (Shift+click changes the values by one unit).

Vertical shift is measured as a percentage. Leading can also be measured as a percentage of the font size. To complicate matters, however, it can also be set as an absolute point size or as a relative point size (for example, "12pt" or "+3pt" respectively) and the applet must take account of this. Tracking is measured in 1/1000ths of an em (the width of the letter 'm'). However, *OvPro* will not currently allow the

```
int textpal_handle;
int textpal_centre = 1;
int textpal_open = 0;
int textpal_views = 0;
int textpal_shaded = 0;
int textpal_lval;
int textpal_vval = 0;
string textpal_lrel = "";
string textpal_lunit = "pt";
string textpal_vunit = "%";
void textpal_update(int file)
{
  string leading;
  setcurrentfile(file);
  textpal_vval = getbaseshift()/655;
  getleading(leading);
  textpal_leading(leading);
  writeicon(textpal_handle, 1, leading);
  writeicon(textpal_handle, 5, itos(textpal_vval)+"%");
  refresh_area(0, textpal_handle, 214, -26, 326, -144);
  viewrepaint(currentview(), currentfile());
}
void textpal_textupdate(int user, int file)
{
  if(textpal_open) textpal_update(file);
}
void textpal_openpalette()
{
  display_window(textpal_handle, 0, textpal_centre);
  textpal_centre = 0;
  textpal_open = 1;
  textpal_update(currentfile());
}
void textpal_closepalette()
{
  close_window(textpal_handle);
  textpal_open = 0;
}
int textpal_entry(int entry, int subcode)
{
  if(textpal_open) textpal_closepalette();
  else textpal_openpalette();
  return(0);
}
int textpal_tick(int entry, string &text)
{
  return(textpal_open);
}
void textpal_closepal(int handle)
{
  textpal_closepalette();
}
void textpal_click(int handle, int icon, int buttons, int
mousex, int mousey)
{
  int amount = bbc_inkey(-1)?1:10;
  if(handle == textpal_handle && textpal_shaded) textpal_c
aret(0, 0, 1);
  if(buttons == 1) amount = -amount;
  if(buttons != 2)
  {
    switch(icon)
    {
      case 2:
        if(textpal_lrel == "") setleading(itos((((textpal_
lval-amount) < 0) ? 0 : textpal_lval-amount))+textpal_lunit);
        else
        {
          if(textpal_lval-amount < 0) textpal_lrel = "-";
          else textpal_lrel = "+";
          setleading(textpal_lrel+itos(textpal_lval-amount
)+textpal_lunit);
        }
        break;
      case 3:
        if(textpal_lrel == "") setleading(itos((((textpal_
lval+amount) < 0) ? 0 : textpal_lval+amount))+textpal_lunit);
        else
        {
          if(textpal_lval+amount < 0) textpal_lrel = "-";
          else textpal_lrel = "+";
          setleading(textpal_lrel+itos(textpal_lval+amount
)+textpal_lunit);
        }
        break;
      case 6:textpal_vval = textpal_vval - amount;
        setbaseshift((textpal_vval)*65536/100);
        break;
      case 7:textpal_vval = textpal_vval + amount;
        setbaseshift((textpal_vval)*65536/100);
        break;
      case 10:
        if (buttons == 4) type(bbc_inkey(-1)?"{C_;}":"{CS_
;}");
        else type(amount==1?"{C_'}":"{CS_'}");
        break;
      case 11:
        if (buttons == 4) type(bbc_inkey(-1)?"{C_'}":"{CS_
'}");
        else type(amount==1?"{C_;}":"{CS_;}");
        break;
    }
  }
}
int textpal_keypress(int handle, int icon, int key)
{
  string leading, vshift;
  int len;
  if(key == 13)
  {
    leading = readicon(handle, 1);
    vshift = readicon(handle, 5);
    textpal_leading(leading);
    setleading(leading);
    len = slen(vshift);
    textpal_vval = stoi(mids(vshift, 0, len-1));
    setbaseshift(textpal_vval*65536/100);
  }
  return(0);
}
void main(void)
{
  string help = "{TEXTPAL_01}";
  translate(help);
  script_menu_initialise();
  addentry_menu(script_handle,"textpal_entry","textpal_tic
```

The reduced listing of the TextPal applet's Library file. Key: functions, brown; numbers, red; variables, green; strings, blue; commands, purple. The string command is coloured green by Zap rather than purple like int because it's not a C declaration (the C mode for Zap works well for OPSL except for occasional glitches like this).

Part two of John Pettigrew's Ovation Pro tutorial

nPro

value of the tracking to be read by an applet so we can't display it (although we can alter it).

Into the code

The first thing to notice is the global-variable declarations that start the listing (lines 1 to 10). These must be at the start of the program and outside any functions (variables declared inside functions can only be used within the scope of that function). It is also important to make sure that your global variables won't interfere with any variables in other applets or the main application itself. The best way to do this is to prefix each variable with the applet's name (as here).

The main() function in *TextPal* (lines 113 to 128) is similar to that from the *Pointless* applet last month. The first difference is the variable help, which I'll explain later. Because this variable is defined within a function, it is a local variable; local variables must be defined before you do anything else in the function.

Creating a menu entry in the Applets menu is done in the same way as last month. After this, we can create our window from the template file using the OPSL command createwindow(). The variable textpal_handle stores a number that we'll use to refer to the window elsewhere in the applet; this is known as the window's 'handle'.

The next few lines tell *OvPro* which events we are going to be interested in. The window events we're interested in here are the text palette being clicked on with the mouse, typing in the palette and the palette closing. The addwindow handler() command takes a number indicating the nature of the event, the handle of the window we're interested in and the name of the function in the applet that will deal with this event.

The event handlers are registered similarly, using addeventhandler(). In this case, we're interested in views being opened and closed, the caret moving between views and the text at the cursor changing. In this case, we don't pass a window handle. Instead, the middle number can be used to tell a function what event has triggered it (this number is passed to the function when the event happens). The last line in the main function will create a button macro on the toolbar for our applet. If it's not already been defined, this will create a macro to open or close the palette by calling the same function as is called when the Applets menu entry is clicked on. The button will take its sprite from the *Buttons22* file in the *AResources* directory (Figure I).

Adding a button is the reason for the help variable. This takes another text string from the Messages file and uses it for to support interactive help. To do this, we declare a variable and set it to contain a token for the relevant message. This is then translated: help now contains the text from the *Messages* file rather than the pointer to it. To see the effect, run the *!Help* application in your *Apps* directory and place the pointer over the buttonbar.

Managing the window

The first task we need to do is to open and close the text palette when the Applets menu entry is clicked on (or the button is pressed). The function that handles this is shown in lines 39 to 44. It's very short because it's actually quite easy. If the palette is closed, we want to open it; if it's open, we want to close it (lines 27 to 33 and 34 to 38, respectively). In OPSL, you can use a variable itself as a truth test. In this case, if textpal_open is true (non-zero), we execute the following statement. If it's false (zero), we execute the statement after the else instead.

To open the window, we use the OPSL command displaywindow(), which allows you to control whether the window is opened in the centre of the screen. In this case, we set the textpal_centre variable to 1 when we declared it and so the palette will be centred first time. After opening the palette, we set it to 0 so that it will reappear in its last position on subsequent openings. Closing the palette is even easier: use the OPSL command close_window() and set textpal_open to zero.

If the user has typed into the palette, we're only interested once they've finished; that is, pressed Return. Then we read the values from the window and set the text. This only applies to the leading and shift, of course, because we can't display the current tracking value.

The function to do this is in lines 97 to 112. First, we declare the local variables we'll need. Then, test to see whether the key that was pressed was Return. Setting the leading is simple

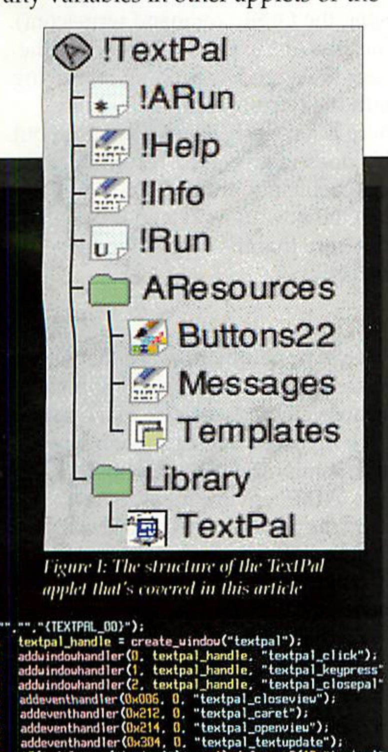


Figure I: The structure of the TextPal applet that's covered in this article

```
k","","","{TEXTPAL_00}");
119   textpal_handle = create_window("textpal");
120   addwindowhandler(0, textpal_handle, "textpal_click");
121   addwindowhandler(1, textpal_handle, "textpal_keypress"
122   addwindowhandler(2, textpal_handle, "textpal_closepal"
123   addeventhandler(0x006, 0, "textpal_closeview");
124   addeventhandler(0x212, 0, "textpal_caret");
125   addeventhandler(0x214, 0, "textpal_openview");
126   addeventhandler(0x304, 0, "textpal_textupdate");
127   if(isdefmacro("textpal") == -1) defmacro2(12,"textpal"
{textpal_entry(0,0)}","textpal",help);
128 }
```

because this is stored by *OvPro* as a string. The vertical shift is slightly harder because this is stored as a number.

So we need to take the numerical portion of the string in the icon (all but the last character) and convert this to an integer using the command stoi() (String TO Integer). The shift value is held internally at a higher resolution than the percentage value so we have to convert it as shown here when setting it.

Clicking in the palette

Mouse clicks are slightly more complicated, partly because we have to deal with several icons and partly because there are three mouse buttons. Lines 55 to 58 deal with the first part of mouse clicks.

First, we test to see whether the Shift key is pressed, because we'll use this to change the amount the buttons move by. The '?' operator used here is extremely useful. This is called the conditional operator: if the first expression is true (non-zero), it returns the first value (before the colon); if the expression is false (zero), it returns the value after the colon. Thus, line 55 first declares the integer variable amount, then sets it to either 1 or 10, depending on the value returned by bbc_inkey(–1); that is, depending on whether the Shift key is pressed.

The next line deals with palette shading. The textpal_caret() function (not in the listing) is automatically executed whenever a view gains or loses the caret (we registered this event in the main() procedure) and shades the palette if *OvPro* is losing the caret. However, if the caret has moved to the palette, we don't want it shaded, so that the user can type into it. Hence, when we register a click in the palette, we need to make sure the palette isn't shaded. The next two lines (57 and 58) control the effects of buttons. Line 57 inverts the value of amount if the Adjust button was used (if it was 10, it's now –10), which means that the mouse click will have the opposite effect on the value when the following commands are run. Line 58 means that the following lines will only be executed if the icon was clicked using Select or Adjust (not Menu). Lines 60 to 93 are a set of cases: each section (between case and break) is executed only if the icon number (as passed to the function by *OvPro*) matches the given value.

Thus, if icon 6 is clicked, to change the vertical shift value (see Figure II for the icon numbers), we first reduce the variable holding the current vertical shift by amount; if amount is negative, we are thus increasing its value.

Next, we set the shift value, correcting to match *OvPro*'s internal numbering as before. Icon 7 is similar, except that we are adding the value of amount to the shift (because the arrow direction is opposite). The leading is more complicated, because we need to take account of the different ways of recording it. Again, I used the ? operator quite a lot to make the code more compact. There's no need here to explain this in detail, the principles are what's important: increase or decrease the value, add the relevant units and pass the string produced to the setleading() command.

Setting the tracking/kerning value shows a different way of doing things. There are no OPSL commands for viewing or setting the tracking. However, there are built-in keyboard shortcuts to increase and decrease it, and the applet can use the shortcuts to save you from having to remember them.

The type command will type the indicated text at the cursor. The { } indicate a DDL (*OvPro*'s document description language) command. In this case, it's a keyboard shortcut: 'CS_' and 'C_' mean 'Control+Shift' and 'Control', respectively, and give you access in applets and macros to any keyboard that you've defined.

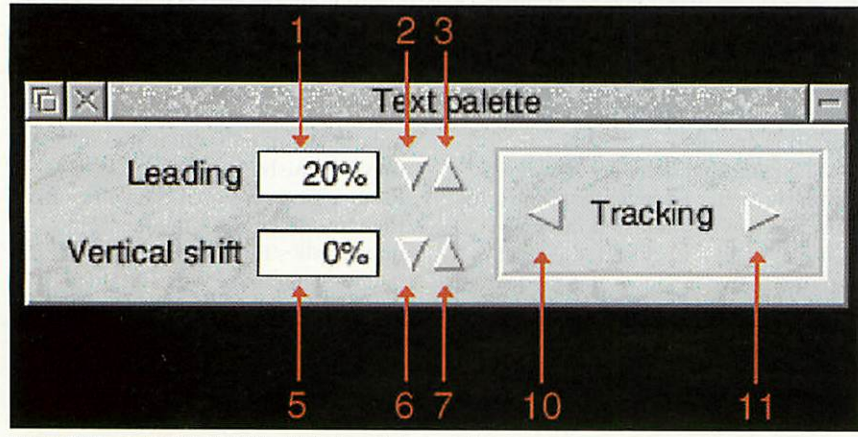


Figure II: The text palette itself; the labels show the icon numbers.

Other bits

There are a few other important functions in the applet. So far, we've dealt with the functions that open and close the palette, and that handle key presses and mouse clicks. However, we also need to change the values displayed in the palette to match the vertical shift and leading of the text at the caret. The functions that does this are textpal_update() and textpal_textupdate(). Having separate functions means that other functions (such as those that deal with mouse clicks and key presses) can call the update function easily.

The compensation for the vertical shift values is approximated here as 655, rather than 655.36 (65536/100) as before. This is because this is necessary to avoid rounding errors because OPSL does not use floating point maths, only integers.

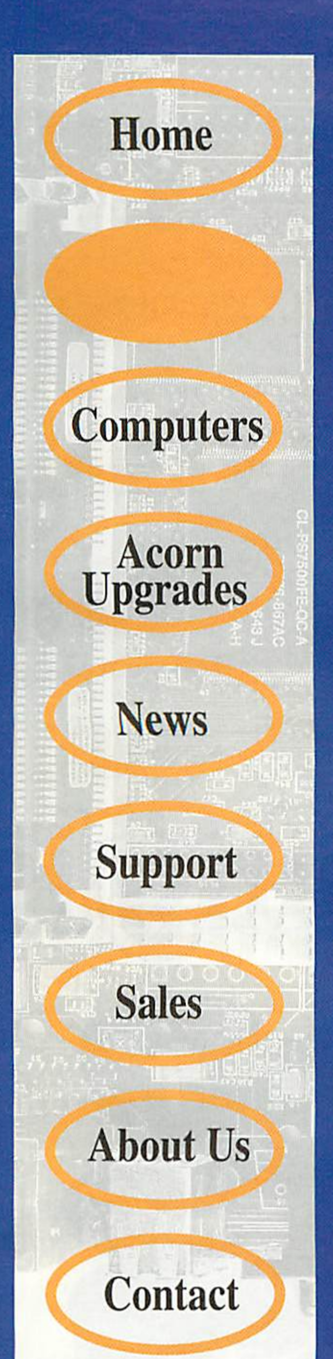
The textpal_textupdate() at lines 11 to 22, reads the values of the vertical shift and leading at the cursor and sets the global variables to the relevant values. To do this, it has to dissect the leading string to extract the numerical portion and the units from the string using the function textpal_leading(), which isn't included here.

Once the global variables are set, we write these values to the icons using the OPSL command writeicon(). The area of the palette containing the icons is flagged as needing redrawing with the refresh_area() command; there is a refresh_icon() command but this doesn't give good results because of a problem with RISC OS. Finally, the *OvPro* window (view) is updated to ensure that it's displaying the text correctly.

Finishing up

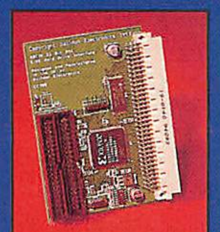
You can hopefully now see that OPSL makes it quite easy to write applets, because *OvPro* takes care of the hard work involved in creating windows and menus, and dealing with RISC OS's WIMP environment. As a result, applets can be quite short: even dealing with windows and text like *TextPal* produces less than 150 lines of code. Don't forget, though, when you're writing your own applets, that *OvPro* loads applets when it starts up. This means that you'll need to rerun the application every time you want to test a change to your applet.

Next month, I'll be showing how to create your own files from an applet, as well as handling menus and other things. END



MicroDigital peripherals for Acorn computers

Awesome 32 bit IDE controller card



The 32 bit Awesome EIDE controller card for the Risc PC is simply the quickest interface around. The card is a spin off from our Mico computer development program from which more products will come.
Awesome uses full 32 bit DMA access and depending on the drive fitted transfer speeds better than 7MB/sec can be achieved, and that's real world speeds, over four times as fast as any built-in interface. Supports four IDE devices, hard discs up to 8 partitions, r/w, read only and no access status plus password protection. Includes CDFS and ATAPI CD drivers.

Model	order code	price
All Risc PC	MDAWE32	£ 122.00

Warranty : 5 years return to base

Rage 16 bit IDE controller card

The 16 bit Rage IDE controller card for Acorn A310, A400, A5000, A540, A7000 and Risc PC is easy to fit, simply plug in. Rage uses DMA on the Risc PC with overall performance twice as fast as the built-in interface. Supports four IDE devices, hard disc up to 8 partitions, r/w, read only and no access status and password protection. Includes CDFS and ATAPI CD drivers. Connectors available for internal and external devices.

Models	order code	price
See above	ACARCIN	£ 58.00

Warranty : 5 years return to base

Swift 8 bit IDE controller cards

The 8 bit Swift IDE controller card for Acorn A3010, and A3000, is easy to fit, self configuring, simply plug in. Swift controllers are available with either external IDE connector or User Port.. Supports four IDE devices, hard disc up to 8 partitions, r/w, read only and no access status and password protection. Includes CDFS and ATAPI CD drivers.

Models	order code	price
See above	ACA3INEC	£ 62.00
See above	ACA3INUP	£ 62.00

Warranty : 5 years return to base

IDE CD ROM drives



All CD ROM drives are fully tested to meet the requirements of our Zero Defect Quality Assurance Programme, and they are covered by our twelve month no quibble guarantee.

Price includes 48 speed drive unit and data cable

Model	order code	price
A7000 A7000+ All Risc PC models	ACIDECDIN48	£ 58.00

Price includes drive unit, Rage 16 bit controller card, data cable, software includes CDPlayer, Photoview, ChangeFsi, utilities disc and manual.

Model	order code	price
All Risc PC models	ACIDECDIN48R	£ 110.00

Price includes drive unit, Awesome 32 bit controller card, data cable, software includes CDPlayer, Photoview, ChangeFsi, utilities disc and manual.

Model	order code	price
All Risc PC models	ACIDECDIN48A	£ 175.00

External CD drive with controller card include: Housing, drive unit, power supply, datacable, and controller card. software includes CDPlayer, Photoview, ChangeFsi, utilities disc and manual. Units are tested to meet the requirements of our Zero Defect Quality Assurance Programme, and they are covered by our twelve month no quibble guarantee.

External drive only

Model	order code	price
All models	ACIDECDEX48	£ 134.00

External drive with 8 bit Swift controller card.

Model	order code	price
A3000, A3010 A3020, A4000	ACIDECDEX48S	£ 190.00

External drive with 16 bit Rage controller card.

Model	order code	price
A300, A400 A540, All Risc PC models	ACIDECDEX48R	£ 186.00

External drive unit with Awesome 32 bit controller card.

Model	order code	price
All Risc PC models	ACIDECDEX48A	£ 249.00
Backplane adaptor	EXADP01	£ 24.00

DataStar IDE hard disc drives



All units below prices include: drive unit only.
All drives are fully tested to meet the requirements of our Zero Defect Quality Assurance Programme, and they are covered by our three year no quibble guarantee.

Size/model	Speed	Access	order code	price
6.4GB Seagate	5400 rpm	9.5ms	MDDSSGIDE64	£ 99.00
8.4GB Seagate	5400 rpm	9.0ms	MDDSSGIDE84	£ 120.00
10.2GB Seagate	5400 rpm	9.5ms	MDDSSGIDE102	£ 122.00
13.6GB Seagate	5400 rpm	9.5ms	MDDSSGIDE132	£ 127.00
17.2GB Seagate	5400 rpm	9.0ms	MDDSSGIDE172	£ 141.00
20.0GB IBM	5400 rpm	9.0ms	MDDSIBIDE20	£ 157.00
25.0GB IBM	5400 rpm	9.0ms	MDDSIBIDE25	£ 196.00
37.0GB IBM	5400 rpm	9.0ms	MDDSIBIDE37	£ 288.00
13.6GB IBM	7200 rpm	9.0ms	MDDSIBIDE136	£ 169.00
22.0GB IBM	7200 rpm	9.0ms	MDDSIBIDE22	£ 201.00
27.0GB IBM	7200 rpm	9.0ms	MDDSIBIDE27	£ 257.00
34.0GB IBM	7200 rpm	9.0ms	MDDSIBIDE34	£ 331.00

DataStar IDE hard disc drive with Awesome controller card

Size/model	Speed	Access	order code	price
6.4GB Seagate + Awe	5400	9.5ms	MDDSSGIDE64A	£ 215.00
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Still waiting for the bugs to be fixed in RISC OS 4 before you upgrade?



Yes: We use Acorn Advance at school and tha doesn't work does it!

Oh yes it does! Acorn Advance is now fully compatible with RISC OS 4 thanks to a patch that is available from Clares Micro Supplies Web Site.
`http://www.claresmicro.co.uk/`

Great, but no-one is developing new software, and I can't do my Internet Banking on my Acorn.

Oh yes they are! Softease, for one, are developing a major new educational title, Cerilica will be launching Vantage very soon and new versions of TechWriter and EasiWriter come out so fast, it's unbelievable!
As far as Internet Banking is concerned, you can now get 128bit SSL support for the ANT Internet Suite / Voyager, and Castle will soon be launching a brand new Web Browser.
Oh, and in case we haven't mentioned it before there are now over 2500 RISC OS 4 users out there now in the England, Scotland, Wales, Ireland, Holland, Germany, France, Belgium, Norway, Sweden, Denmark, Israel, Russia, Iceland, Australia, New Zealand, Hong Kong, Japan, Korea and South Africa (to mention a few)

Is there anything else you are waiting for before you buy RISC OS 4?

Yes, when will RISC OS 5 be out?

Well, if you don't buy RISC OS 4 first, there won't be a RISC OS 5 !

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What's on CD?

Paul Johnson reveals all

This May CD is the big *Acorn User* fonts and art CD. By big – I mean big! The CD image is over 640Mb, the largest AU CD ever. So what have I got crammed onto the disc?

We have a couple of exclusive pieces of software; *Euclid2* and *NoticeBoard*. Both are happy under RISC OS 4. It should be noted that these are still both commercial pieces of software and, as such, you may not copy (other than to your hard drive) or disseminate by any means or in anyway alter the code without breaking the law.

Euclid2 has been around since the early days of the A3000. It is still a very nice 3D design package: simple to use and the final results can be made into a projector file which can be run on any machine which has the *Projector* application on it although, under a StrongARM, the animations are extremely fast.

You can get a *Euclid2* manual (a real paper one) from Tau Press from the usual address for £5 (plus p&p which is £0.50 in the UK, £1 Europe and £2 rest of world).

NoticeBoard (from the Really Good Software Company) is a handy piece of kit. Small, fast and efficient, the program is a good way of constructing tutorials for students, noticeboards for shop windows, in fact anything which requires a changing display. The final noticeboards can be run on any RISC OS computer without the need for *NoticeBoard* itself.

The program is happy to use sprites and draw files. Due to it's age, JPEG and Artworks handling aren't supported but you can upgrade to the new version, *NoticeBoardPro* (which is not so much a re-write, more a totally different animal) with the offer from RGSC for just £20 – see the disc for details.

Art for art's sake

There is an abundance of art applications and clip-art files on the disc. The art applications come in four categories – *ArtWorks* plugins, translators, utilities and viewers.

The *Artworks* plugs are by Martin Wurthner and should be placed in your !Artworks.Auto directory. Some of these are shareware, so I would suggest registering them.

Translators cover the likes of *ChangeFSI*, John Kortinks excellent *Translator* and *Creator* applications (both shareware and worth the registration fee) and Tony Houghton's *Art2Spr* application (converts Artwork files and drawfiles to sprites) as well as converters from Draw to Sprite and Draw to Windows Metafile.

The utilities include some new icons for your machine and Nail (version 1.08) – a compact thumbnail creator.

Viewers are exactly what they say they are and include my very own *MultiShow*, there's the manga-fan *Megumi*, *Photofiler* (a handy app which changes the wimp icon to be a thumbnail version of the image it will be) and *Thump*.

Loadsafonts

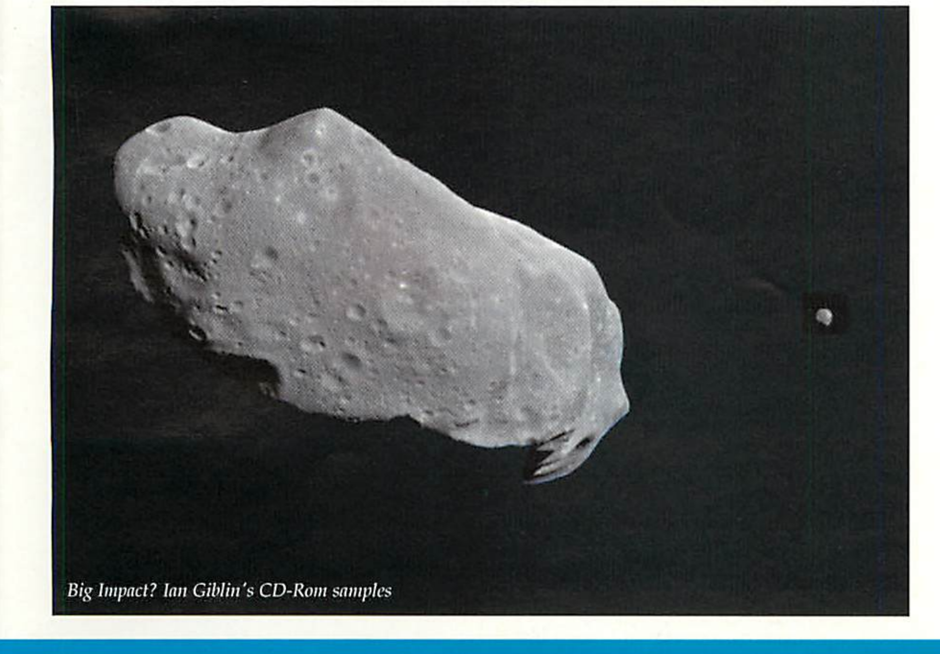
For the first time on any CD, we have *Harry Decker's Font Emporium* (I should point out that this font collection has nothing to do with the font emporium collection published by Zenta. Please do not confuse these and send comments about Harry's emporium to Zenta).

There are hundreds of high quality fonts here, they're well set out and easy to find. Look in the Web sites directory under *Harry_Decker*.

One of the longest established names in the RISC OS font marketplace is the Electronic Font Foundry. Their fonts are internationally recognised as among the best and they have recently released their EFF CD 2. Unlike their very popular PD CD, this one is commercial. They have allowed us to use the font demonstrator for this CD.

The DataStore for many years have been selling the evergreen *FontFX*. The cut-down version (*Font_FX Lite*) is here for your enjoyment with a very nice offer to upgrade to the full version.

I don't suppose any Font and ClipArt CD would be complete without a pile of clip-art so under the ClipArt directory you will find a fair-



Big Impact? Ian Giblin's CD-Rom samples

sized mess of clip-art.

There are selections from the popular APDL PD clip-art discs and from Desktop Projects. Some of the finest though is that of Chris Jarman – as you can see from the yacht below, the quality of his material is extremely high. The clip-art directory from Cybervillage is also present. And for those who like to have an attractive backdrop to their desktop, try the ones held in *Dave_Cooper*.

For those who like a bit of a giggle though, there are some rather amusing pictures in the humorous directory...

What else have we got?

One thing which has been pointed out is that when we have produced covermount CDs, we manage to always miss a cover disc for either the month the CD is published or the one after it. With help, I've found some of them so the Feb 2000 to April 2000 (virtual) floppies are also included. After a high level editorial meeting, we have decided to include two new directories:

Cover_Support are full reprints (and expanded versions) of *Acorn User* articles. This time, we have ARM-Linux for the Risc PC, Simon Anthony's *Draw* tutorials, a selection from Ian Giblin's *Impact CD* and the *TeX* (or as it should be written, Tec) articles (as well as the current version of Tec) in both *Ovation* (not *Ovation Pro*) and *Tech/Easiwriter* formats. A demo of *Ovation* can be found in the Websites directory under *David_Pilling*.

Updates is possibly one of the most useful directories around. Not only does it contain the newest released versions of the Toolbox from RISCOS Ltd, but also the final patches made available from Acorn for RISC OS 3.6 and 3.7.

Along with these gems, there are updates to some of the most popular pieces of software around such as OSLib, updates for the Castle SCSI2 Storm SCSI card, FTPc, fixes and updates for the Kosovo CD (which is still available from APDL) and a free version of ZipFS and CDFS_PowerTec from Partis.

Gary Partis recently took over the upkeep and development of the PowerTec range of software previously distributed by AISystems.

AISystems have unfortunately now downsized and changed direction, leaving the RISC OS marketplace – a sad loss. The ZipFS software will allow you to read zip discs – either 250Mb or 100Mb ones in DOS or RISC OS formats and is RISC OS 4 happy.

If you have the new boot structure (which if you didn't already have it installed, can be done using the last AU CD), the software should be placed in the !Boot.choices.boot. predesk directory.

Web sites

This time we have the entire websites from Icon Technology (including the upgrades to *Writer*, *EasiWriter* and *TechWriter* – you must have the original versions of these pieces of software for the upgrades to work), David Pilling (he of *OvationPro* and *SparkFS*). The site includes plenty of software upgrades, free software and *Ovation Pro* applets.

To prove how talented Chris Jarman really is, his current Web site is included for you. It's really worth a look.

Finally, there is Harry Decker's Font Emporium.

Last words

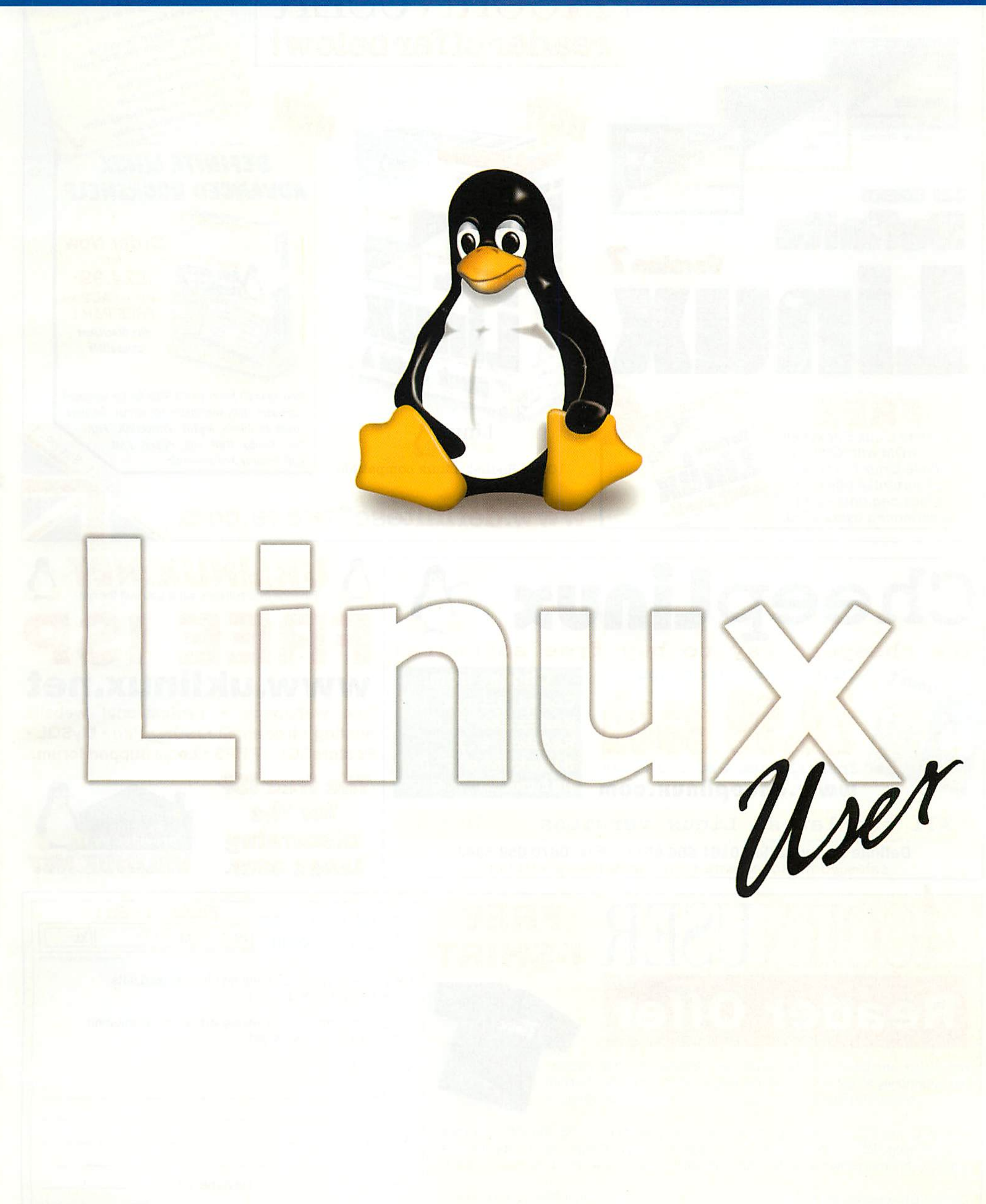
There you have it, the 9th outing of the Acorn User cover CDs. I hope you enjoy it. The next AU CD is a games spectacular: but if you have anything else you wish to contribute, please send it on floppy disc (CD or Zip discs are okay) to *Acorn User*.

I must thank Roy Heslop of CTA for helping out when my CD burner died just before the CD was mastered. Worra guy! END



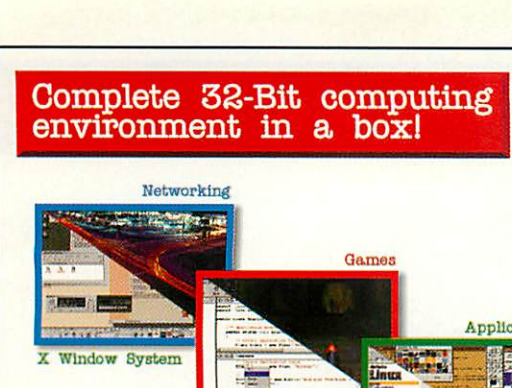
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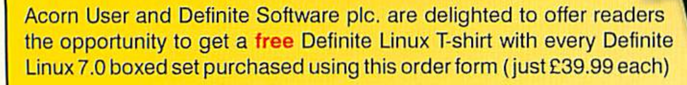
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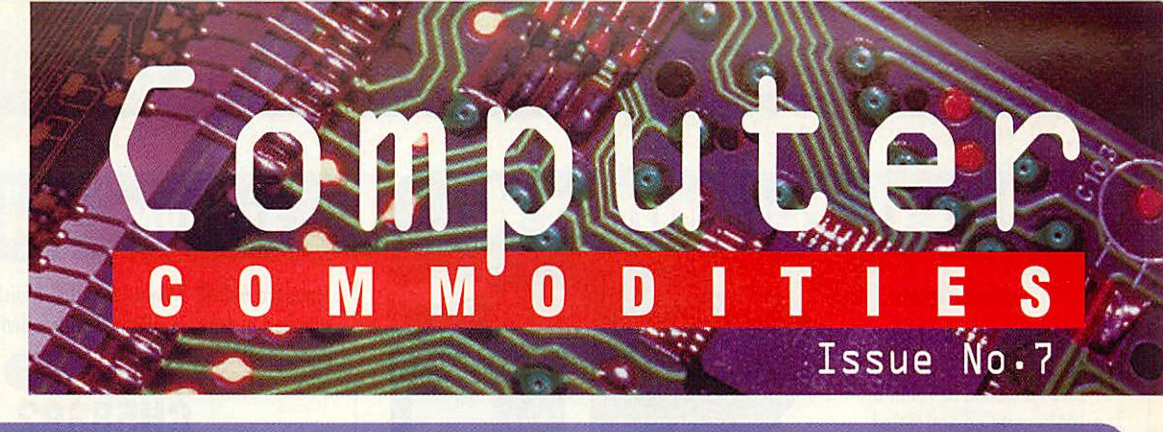
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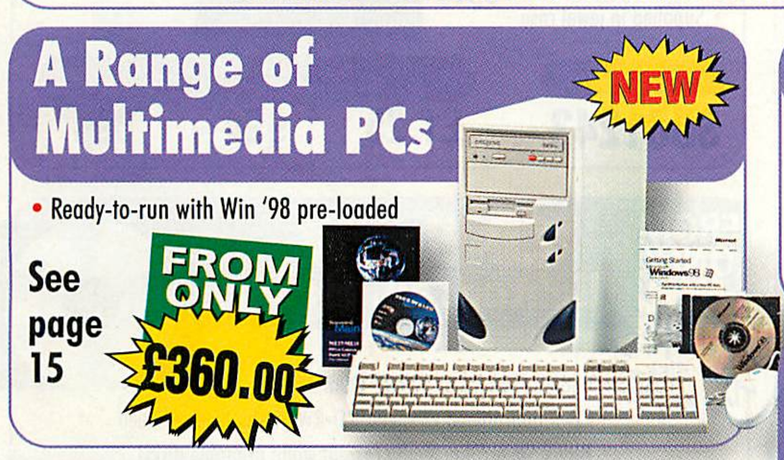
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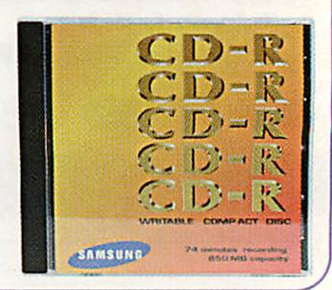
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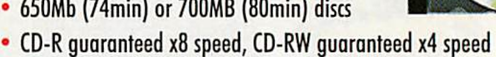
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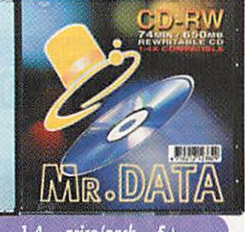
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- Ideal for printing by inkjet or writing with CD-R pens
- Individually jewel cased with blank sleeve

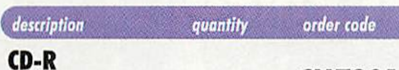
i Storage Box
- Supplied with 25 74min CD-Rs
- Silver/white CD-R finish, Reflex brand
- High impact plastic storage box
- CD-Rs stored in individual tyvek sleeves
- Complete with file tabs and adhesive labels
- Requires 36% of the space of 25 jewel cased CD-Rs
- Dimensions (HxWxD): 130x130x90mm

order code	description	quantity	price/pack
	CD-R Reflex Brand		
CH37662	74 min Blue	1	£1.43
CH37663	74 min Green	1	£1.43
CH37661	74 min Red	1	£1.43
CH09233	74 min Silver/White	1	£1.43
CH65748	80 min Silver/White	1	£1.55
CH65726	i Storage Box	25	£32.06
	CD-R Printable		
CH10165	74min White	1	£1.52
	CD-RW Reflex Brand		
CH53399	74min Silver/White	1	£7.78

MR. DATA Slimline Jewel Case CD-R/RW Media

- 650MB (74 min) or 700MB (80 min) discs
- CD-R guaranteed x8 speed, CD-RW guaranteed x4 speed
- Silver/Blue Media
- Inlay card
- Supplied in a slimline jewel case (only 5mm wide compared to 10mm width of standard jewel cases)





description	quantity	order code	price/pack 1-4	5+
CD-R				
74min Jewel Case	10	CH73012	£7.99	£7.75
80min Jewel Case	10	CH73013	£10.70	£10.38
CD-RW				
74min Jewel Case	10	CH73014	£25.99	£25.21

TDK 4/8mm Data Cartridges



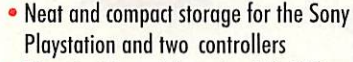
		price each 1-4	5+
CH10166	4mm 60m DC4-90R	£2.80	£2.54
CH10167	4mm 120m DC4-120	£8.10	£7.36
CH10168	8mm 112mm DC8-11	£4.20	£3.81

CD-ROM Drawer

FROM ONLY £5.51

CD Rom Drawer with a capacity of 20CDs. Drawers interlock to allow stacking. Each drawer is lockable and is supplied with two keys.

Technical Data
- Dimensions (LxWxH) 325 x 170 x 151mm



order code	price each 1-9	10+
CH01587	£5.63	£5.51

Space Station Storage System

- Neat and compact storage for the Sony Playstation and two controllers
- Fits televisions of footprint 348x350mm
- Maximum weight 80kg
- 2-stop drawer enables immediate access and use of controllers and playstation
- The Space Station is supplied with a CD game rack
- Ensures maximum ventilation whilst keeping the playstation dirt and dust free
- Manufactured from high impact ABS plastic
- CD game racks are also available separately
- Dimensions (HxWxD): Storage Unit 95x395x380mm; CD Rack 70x135x48mm






order code	description	price each 1-2	3+
CH54815	Space Station	£13.75	£12.76
CH54816	CD Rack (Twin Pack)	£6.87	£6.34

CD Tower

Each tower can store up to 20 CD ROMs or audio CDs in their jewel cases. Made from durable plastic, towers can be stacked vertically or horizontally, as required. Can be desk or wall mounted.

Technical Data
Dimensions (LxWxH) 120x140x314mm



order code	price each 1-4	5+
CH09721	£2.75	£2.50

Multimedia Speakers

Model : Quickshot Soundmate 4

Features:
- Output power of 2 Watt (RMS) / channel
- Frequency response: 100Hz - 14KHz
- Power, volume, balance and bass & treble boost switches
- Powered by 4 x 'C' batteries or 6Vdc adaptor (not included)
- Dimensions: 100x160x105 (WxHxD)





ONLY £1.95 PER PAIR

order code **SB01401**

Active 60W PMPO Loudspeakers

- 60W total peak (PMPO)
- Magnetically shielded • Operates on 240Vac
- Built-in stereo amplifier
- 3.5mm stereo jack input plug
- Controls: on/off, volume, headphone jack
- Dimensions (HxWxD) 190 x 75 x 120mm

order code	1-4 price/pair	5+
CH42584	£6.74	£6.24

30W PMPO Indiana Speakers (non-amplified)

Technical Data FUJITSU
- 30W PMPO • 4 Ohms

Dimensions (HxWxD): 215x90x140mm
Weight: 690g per speaker (approx)

Note Magnetically shielded, quality, slim-line speakers, with 3.5" stereo jack plug and 3m lead.



ONLY £5.15 PER PAIR

CD not included.

order code **SB00551**

Multimedia Speakers

Model: Quickshot Sound Force 560

Features:
- Active speakers with a total output of 7.5W (RMS)
- Frequency response of 50Hz - 18kHz
- 3" magnetically shielded drive unit
- AC adaptor included
- Dimensions: 215x93x160mm (HxWxD)



ONLY £8.25 per pair

order code **SB01405**

Active 24W Speakers

- Built-in amplifiers with 2 x 12W PMPO output
- 3" Speaker unit with 40Hz to 16KHz response
- Bass boost switch
- Headphone socket, 3.5mm
- For use with multimedia or audio inputs
- Powered by 4 x 'C' cells or external 6Vdc adaptor (not supplied)
- Dim: 96 x 140 x 120 (WxHxD)



While Stocks Last

order code	price/pair
SB00834	£5.15

Active 100W PMPO Speakers

Powerful speakers in a compact design.
- 100W PMPO • 3" full-range drivers
- Magnetically shielded • LED power indicator
- Air woofer design enhances sound • Low distortion
- Supplied with all leads, power adaptor and instructions

Technical Data

Power (PMPO)	100W total
Frequency Response	70 - 18kHz
Controls	Power, volume, tone
Input Connection	via 3.5mm stereo jack
Power	via mains adaptor supplied
Dimensions	93x188x115mm

order code **CH09736**

price/pair 1-4	5+
£14.07	£12.13

60W PMPO Indiana Speakers (non-amplified)

Technical Data FUJITSU
- 60W PMPO
- 4 Ohms

Dimensions (HxWxD): 225x147x160mm (cabinet)
Bass Speaker Diameter: 100mm
Weight: 1.5kg per speaker (approx)
Includes lead (bare ends to DC plug)

Note This is a solidly constructed, quality, magnetically shielded bass reflex unit, with tweeter. Terminals are sprung type.



ONLY £8.25 PER PAIR

CD not included.

order code **SB00550**

240W PMPO Speaker System

Model Nicole SD983

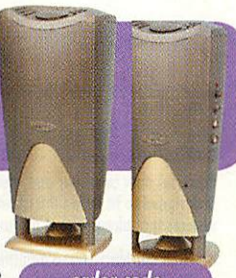
Technical Data

Frequency Response	50Hz to 20KHz
Controls	On/Off/Volume, Bass, Treble
Dimensions - WxHxD	13.5 x 19.5 x 17cm
Input	via RCA phono
Power	Mains via IEC320 'T' adaptor



order code	1-2 price/pair	3+
SB01389	£12.99	£11.99

580W PMPO Speaker System



Model Nicole SD9922

A stylish 'Art Deco' speaker system which has been designed to provide '360°' sound by having downward pointing speaker units to disperse the sound. A microphone input and headphone output (all 3.5mm) are available.

Technical Data

Frequency Response	20Hz to 20KHz
Controls	On/Off, Volume, Bass, Treble
Dimensions - WxHxD	14 x 33 x 15cm
Input	via 3.5mm stereo jack plug
Power	Mains 240V via 13A plug

order code **SB01375**

price/pair **£61.99**

480W PMPO Subwoofer Speaker System

Add those 'deep' sounds to your games or portable audio with this subwoofer system. The AC power is obtained via a 'T' tap from the back of the PC's IEC320 power cable, meaning that a separate 13A plug is not required.

Technical Data	Satellite	Subwoofer
Output - RMS	6 Watts	10 Watts
Frequency response	200Hz to 20KHz	80Hz to 200Hz
Drive Unit	3"	4"
Controls	On/Off, Volume, Bass	-
Dimensions - WxHxD	10 x 19 x 10cm	17 x 25 x 22cm
Input	via 3.5mm stereo jack plug	-
Power	Mains 240V via 'T' lead	-

order code **SB00818**

price each **£28.99**

520W PMPO Speaker System

Model Nicole SD638s

- 3D effect switchable from front panel
- Ported cabinet
- Line out available on rear

Technical Data

Frequency Response	40Hz to 20KHz
Speaker Unit	3" and Tweeter
Controls	On/Off/Volume, Bass, Treble
Dimensions - WxHxD	16 x 25 x 21cm
Input	via RCA phono
Power	Mains via 13A plug

order code **SB01387**

1-2 price/pair 3+ **£27.80 £25.75**

650W PMPO Subwoofer Speaker System

The speakers are of a cylindrical design making a pleasant change to the more usual 'rectangular' boxes as in most other systems. The AC power is obtained via a 'T' tap from the back of the PC's IEC320 power cable, meaning that a separate 13A plug is not required.

Technical Data	Satellite	Subwoofer
Output - RMS	10 Watts	15 Watts
Freq. response	150Hz to 20KHz	40Hz to 200Hz
Drive Unit	3"	5"
Controls	On/Off, Volume, Bass, 3D	-
Dims - WxHxD	11 x 29 x 11cm	20 x 29 x 22cm
Input	via 3.5mm stereo jack plug	-
Power	Mains 240V via 'T' lead	-

order code **SB00817**

1-4 price each 5+ **£40.99 £35.99**

CREATIVE FPS1000 Loudspeakers

- Surround sound 3D positional audio for 3D capable sound cards
- Four powered satellite speakers and a powered subwoofer for EAX and DirectSound 3D games and applications that support 4 channel output
- Individual stand for each satellite and two floor stands for rear satellites
- Four channel RCA connection

Technical Data

No of Speakers	4 Satellites, 1 Subwoofer
Power Output	
Satellites	7W (RMS) per channel
Subwoofer	25W (RMS)
Total	53W (RMS)
PMPO	320W
Frequency Response	
Satellites	150Hz-20kHz
Subwoofer	50Hz-180Hz
Impedance	4Ω
Amplified	Yes
Magnetically Shielded	Yes-Satellites
Power Source Included	12V dc
Colour	Black
Dimensions (HxWxD)	
Satellites (each)	87x87x87mm
Subwoofer	350x164x200mm

order code **CH72221**

price each **£59.51**

480W PMPO Subwoofer Speaker System

Model Nicole SD522

A subwoofer speaker system with a built-in '3D' effect function which is switchable from the front panel. The speaker grilles on the satellite speakers are removable.

Technical Data	Satellite	Subwoofer
Frequency Response	20Hz to 20KHz	
Drive Unit	Tweeter + 2¾"	4"
Controls	On/Off, Volume, Bass, Treble	-
Dimensions - WxHxD	11 x 17 x 17cm	17 x 25 x 28cm
Input	via 3.5mm stereo jack plug	-
Power	Mains 240V via 13A plug	-

order code **SB01386**

1-2 price each 3+ **£35.99 £33.99**






Internal Micro-Speaker 36W PMPO

A miniature amplifier and speakers which fit inside the PC case. Only for use on systems that already have a soundcard fitted.



Features
- High efficiency stereo amplifier and speakers
- 10W stereo amplifier (36W PMPO total)
- Uses two, high-density Gauss magnet speakers
- Fits exactly into 5.25" drive bays
- Can be angled 15 degrees left or right for the best performance
- Front panel volume control and headphone jack
- Power indicator LED
- Supplied with mounting bracket for speaker cable to audio card and screws

Technical Data

Dimensions	41x145x91mm (HxWxD)
Input Conn.	3.5mm stereo jack plug on fly lead
Power Conn.	Standard PC IDE power connection with pass-through
Output Conn.	3.5mm stereo jack socket (headphones)

order code **CH09758**

1-4 price each	5+
£11.25	£10.68

Internal Micro Speaker 60W PMPO

Powerful mini amplifier and speakers with subwoofer which is designed to fit inside the PC case. Only for use on systems that already have a soundcard installed.

- High efficiency stereo amplifier and speakers
- PMPO 60W micro-speaker
- 4" subwoofer included
- Built-in two high density Gauss magnet speakers
- Fits exactly into 5.25" bays
- Can be angled 15 degrees left or right
- Front panel volume control, loudness on/off and headphone jack
- Power indicator LED
- Supplied with mounting bracket for speaker cable to audio card and screws

Technical Data

Dimensions (HxWxD)	41x146x154mm
Input Connection	3.5mm stereo jack on fly lead
Power Connection	Standard PC IDE power connection with pass-through
Output Connection	3.5mm stereo jack socket (headphones)

order code **CH09759**

1-4 price each	5+
£13.45	£12.80

Internal 60W Speaker (LED Display)



- Fits in standard 5.25" drive bay
- PMPO 60W micro speaker
- Loudness function
- Digital volume meter display in red/green/yellow
- 15° left or right angle adjustable
- Front panel volume control adjustable
- Front panel volume control and headphone jack
- Only for use on systems that have a sound card
- 3" x 2 magnetically shielded speakers
- 4" subwoofer speaker
- Power connection via standard 5.25" power connector
- Input is taken from sound card via 3.5mm stereo jack plug

order code **CH43176**

1-4 price each	5+
£13.38	£11.47

Combination Parent and Child Mouse Set

While Stocks Last

- Connected together using switchable adaptor
- 2 button child mouse, 3 button parent mouse (400dpi)
- Supplied with setup diskette
- Serial port design

order code **SB01305** price each **£2.05**

Replacement Computer Mouse Ball



Suitable for use in mice and trackballs requiring a 22mm diameter ball.

Note Mouse not included

order code **CH00823**

1-4 price each	5+
94p	86p

AirMouse Scrolling Mouse

Features
- 8 direction scroll button for easier scrolling
- 2 standard mouse buttons • 1.3 metre cable
- 2 SmartButtons which access 8 preset functions including:- program switching, autoscroll, data zoom, Web page change
- PS2 connector fitted but serial adaptor (9 pin) supplied
- Microsoft IntelliMouse compatible mode
- Windows 3.1/ 95/ 98/ NT compatible (only 2 button in DOS)

Contents AirMouse, PS2-AT adaptor, user instructions and driver disk .

FROM ONLY £7.20

order code **SB00822**

1-9 price each	10+
£7.70	£7.20

Joypad

While Stocks Last



Model AJP384A

Features
- IBM compatible
- 6 standard function/fire buttons
- 8 direction control pad
- Turbo function
- 5 foot cable with 15 pin connector
- 2 extra fire buttons on front edge (dependant on game)

ONLY £4.10

order code **SB01268**

Joystick Switch

Model: Quickshot Qs-5845

Features:
- A manual 4-way joystick switch
- Variable Turbo control for all 4 inputs
- MIDI input on port 1 only
- Suckers on rear for stability/mounting
- Active joystick LED indicator
- '2 player' mode (uses basic functions only)
- Four foot connection lead

ONLY £3.99

order code **SB01403**

Star Wars: Episode 1 Mouse Mats


Anakin Skywalker

Battle Droid


Darth Maul


Queen Amidala

- 5mm depth
- Dims: (HxW): 216x191mm

While Stocks Last

order code	description	1-4 price each	5+
CH63671	Anakin Skywalker	£4.97	£4.62
CH63670	Battle Droid	£4.97	£4.62
CH63702	Darth Maul	£4.97	£4.62
CH63669	Queen Amidala	£4.97	£4.62

Star Wars: Episode 1 Mice

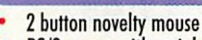
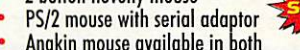

Anakin Skywalker


Anakin Skywalker 3D

Darth Maul

Jar Jar Binks

- 2 button novelty mouse
- PS/2 mouse with serial adaptor
- Anakin mouse available in both standard and 3D design, all other mice are decorated in standard design

While Stocks Last

order code	description	1-4 price each	5+
CH63676	Anakin Skywalker	£10.75	£9.98
CH63677	Anakin Skywalker 3D	£12.35	£11.47
CH63673	Darth Maul	£10.75	£9.98
CH63675	Jar Jar Binks	£10.75	£9.98

Star Wars: Episode 1 Mouse & Mat Set

Jar Jar Binks


Darth Maul


Anakin Skywalker 3D

While Stocks Last

Combination mouse and mat set.

Mats:
- 5mm depth
- Dims: (HxW): 216x191mm

Mouse:
- 2 button novelty mouse
- PS/2 mouse with serial adaptor
- Anakin mouse available in both standard and 3D design, all other mice are decorated in standard design

order code	description	1-4 price each	5+
CH63678	Anakin Skywalker 3D	£16.51	£15.33
CH63674	Darth Maul	£14.84	£13.78
CH63672	Jar Jar Binks	£14.84	£13.78

Logic 3 Playstation P7K Gun

- Vibration 'recoil' feature, FEEL EVERY SHOT
- GUNCON AV adaptor included
- Dual speed auto-fire and auto-reload
- Fully compatible with standard konami and namco 'G-con45' software
- 'Machine gun' mode (auto-fire and auto-reload)
- Precision light sensor for accurate targeting
- Handgrip 'safety' duck and re-load feature
- 3m cable

order code	1-4 price each	5+
CH66039	£15.04	£13.78

Standard and Deluxe Mouse Mats

Special rubberised backing to avoid slip. Dimensions: 225 x 195mm approx.

order code	description	price each 1-9	10+
	6mm		
CH00835	Grey	94p	87p
CH00837	Blue		
CH01706	Black		
CH00811	Green		
CH00812	Yellow		
	8mm		
CH00839	Red	96p	88p
CH00838	Grey		
CH01396	Green		
CH01707	Yellow		

Palmpal Graphics Tablet

This graphics tablet provides much greater precision and control than can be achieved with a mouse. Its small size and weight make it very portable and it is ideal for use with laptop computers or in situations where only a small working area is available. It connects to the computer serial port and to the keyboard connection by means of an adaptor.

- Plug and play, extremely simple to install
- Provides an 80x50mm (3"x2") active work area
- Pop-up note function provides novel message pad to create on-screen reminders or messages to friends
- Stylus allows signatures to be applied directly to documents
- Use alongside existing mouse
- Handwriting OCR software converts handwriting into typed text
- Trace from magazines up to 12mm thick
- Resolution from 500 lpi up to 4,064 lpi
- Driver compatible with Windows 3.1, 95, 98 and NT

order code	price each 1-4	5+
CH63755	£24.60	£24.07

Male - Female Fly Lead



0.75m male - female fly lead

While Stocks Last

order code	price each
SB00536	17p

BNC Patch Leads (2m)

While Stocks Last

- BNC plug at each end
- 2m in length
- RG-62 cable
- Strain reliefs fitted on each connector
- Suitable for use in datacommunications applications



Great Deal

order code	price each 1-9	10+
SB00508	£1.55	£1.39



BTC Windows 95 Keyboard





- Specially designed keys for Windows 95 operating system
- PS/2 (6 pin mini DIN connection)
- Dimensions (HxWxD): 33x463x165mm

order code	price each 1-4	5-19	20+
CH65098	£5.50	£5.08	4.95

Windows '95 Keyboard



A Win 95 compatible keyboard with adjustable feet (one position) and an AT connector.

order code **SB00821**

PS2 Keyboard

A standard 102/105 keyboard made by ACER - Model 6512-T9U - with a PS2 connector. It has adjustable feet and dimensions of (LxWxH) 460x165x25-50mm.

order code	price each
SB00704	£7.20

CHERRY G83-6105 Win 95 Keyboards



Cherry G83-6105 entry level 'soft touch' Windows 95 keyboards. Available in both AT (5-pin DIN) and PS/2 (6-pin min DIN) versions.

order code	connection type	price each 1-4	5+
CH09852	AT (5-pin DIN)	£22.26	£21.22
CH09853	PS/2 (6-pin mini DIN)	£22.26	£21.22

PS/2 Extension

- Suitable for extending PS/2 devices (mouse or keyboard)
- 6-pin mini DIN plug to socket (M to F), grey in colour, 1.8m

Note: This is NOT a curly lead, it is a straight extension.

order code	price each 1-4	5+
CH53299	£1.57	£1.39

PS/2 to PC Keyboard Adaptor

Allows PS/2 and compatible keyboards to be used with standard PC/XT/AT machines.

order code **CH08383**

Technical Data

Connectors: 6-pin Mini DIN Socket to 5-pin DIN 180° Plug
Length: 300mm

price each 1-9	10+
£1.51	£1.49

IBM PS/2 Keyboard Adaptors

Used to interface PC/AT keyboards with PS/2 computers. Three versions available.

- 5 pin DIN female to 6 pin mini DIN male

order code	description	price each 1-9	10+
CH01393	Straight Adaptor	£1.43	£1.29
CH01394	Right Angle Adaptor	£1.72	£1.63
CH01395	Cable Adaptor	£2.10	£2.06

IBM Keyboard Extension Lead

6 Pin Mini Din Plug to Socket - Curly Lead. Lead. Length 1.2m (extended)

order code	price each 1-9	10+
CH01488	£1.74	£1.70

IEC Mains Leads

A selection of 10A IEC mains leads.

order code	length	colour	connectors	price each 1-4	5+
SB01148	2m	black	IEC to 13A	£1.25	£1.10
SB01151	3.5m	black	IEC right angle to bare end	69p	59p
SB01147	3.5m	grey	IEC to bare end	69p	59p



UDMA 66 IDE Lead

- Designed for UDMA ATA 33.3, 66.6
- 40-Way standard IDE connector with 80-way 30 AWG ribbon cable (450mm length)
- Master and slave configuration
- Can be used with existing IDE drives as well as the new high speed drives



order code	price each 1-4	price each 5+
CH72155	£8.45	£7.75

RGB Monitor/Video Lead

FROM
15-Way HD D Plug

TO
5 x BNC Plugs

Connection/Application
Colour Coded

Length
2m

order code	price each 1-9	price each 10+
CH62160	£7.55	£6.60

D Type Plastic Hoods with Thumb Screws

Snap together hood.

order code	no of ways	description	price each 1-9	price each 10+
CH08547	9	High Density 15	60p	46p
CH10346	15	High Density 26	75p	72p
CH08548	25	High Density 44	43p	41p
CH10347	37	High Density 62	1.54	1.37

Apple Leads

The cable is individually bagged with Apple header cards and is manufactured to Apple's exacting standards.

Apple Part No.	Cable Description
M3923LL/A	Mac Video extension Cable M/F 1.8m



order code	price each
CH09780	£15.99

Internal Power Lead

From
5.25" Plug

To
5.25" Socket

Connection/Application
Extension

order code	price each 1-9	price each 10+
CH48639	£1.48	£1.44

PC External Data Cable

9 way D plug to 9 way D socket. Wired 1-1, use for extensions, switch boxes etc.

order code	price each 1-9	price each 10+
CH08400	£1.70	£1.53

Parallel Laplink Cable

A Laplink compatible cable for parallel data transfer. 3m in length, 25way-D plug (male) to 25-way D plug (male)

order code	price each 1-9	price each 10+
CH39722	£1.27	£1.23

PC Printer Leads

25-way 'D' plug to 36-way. Centronics interface leads. Computer to printer with parallel centronics interface.
Leads may not be supplied with thumbscrews as pictured

order code	length	price each 1-9	price each 10+
CH01343	5m	£4.19	£4.17
CH01342	3m	£2.90	£2.30
CH01487	2m	£2.01	£1.63

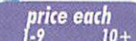
Cat 5 RJ45 Low Profile Patch Cables

A range of RJ45 to RJ45 UTP, Category 5 patch cables. These cables have moulded strain reliefs which allows them to be plugged into wall sockets etc, without the strain relief fouling on the plate. A selection of colours and lengths are available; these are detailed below.

LENGTH	BLUE	GREEN	GREY	RED	YELLOW	1-4 PRICE EACH	5+
0.5m	CH39651	CH39662	CH39673	CH39686	CH39723	96p	87p
1m	CH39652	CH39663	CH39675	CH39687	CH39698	£1.14	£1.01
2m	CH39653	CH39664	CH39676	CH39688	CH39699	£1.50	£1.31
3m	CH39654	CH39665	CH39678	CH39689	CH39700	£1.82	£1.59
4m	CH39655	CH39666	CH39679	CH39690	CH39701	£2.18	£1.90
5m	CH39656	CH39667	CH39680	CH39691	CH39702	£2.52	£2.19
6m	CH39657	CH39668	CH39681	CH39692	CH39703	£2.96	£2.62
7m	CH39658	CH39669	CH39682	CH39693	CH39704	£3.28	£2.91
10m	CH39659	CH39670	CH39683	CH39694	CH39705	£4.41	£3.84
15m	CH39660	CH39671	CH39684	CH39695	CH39706	£6.38	£5.55
20m	CH39661	CH39672	CH39685	CH39696	CH39707	£8.60	£7.48

Switch Box - Extension Cables

These switch box cables are wired all lines 1-1 configuration.
25-way 'D' plug to plug.



order code	Length	price each 1-9	10+
CH01722	2m	£2.28	£2.15
CH01723	3m	£2.84	£2.71

15-Way High Density D Plug to Plug

Description 15 way high density plug to plug
Length 2m

order code	price each 1-9	10+
CH08371	£2.95	£2.65



MOD-SNAP Connector Modules

A range of connector modules for use with MOD-SNAP mounting plates and accessories. Industry standard cut outs: 37x22mm, allow 16mm depth.
RJ-45 Modules: A shuttered connector socket for unshielded 568B Category 5 wiring systems. The modules have rear KATT IDC connections for terminating, using a suitable MOD-TAP, horizontal building wires.
BT Voice (BT6L) and Data (RJ-12/WE6W) Modules: Shuttered connector sockets. For the connection of approved telephone equipment to standard cabling systems.
BNC module (excluding connector): BNC modules with a 13mm BNC connector shut-out.
ISDN module: RJ45 with blue shutter for use with ISDN cabling systems.
Note CH08775 uses plug type CSCP-140.

order code	Description	price each 1-9	10+
CH09345	BT Voice (BT6L) Secondary	£4.47	£3.90
CH09346	BT Voice Mastered	£5.42	£4.72
CH08774	BNC	72p	64p
CH08782	RJ-45 (WE8W)	£4.94	£4.28
CH09347	ISDN RJ45	£6.06	£4.89

Single RJ-45 Face Plate

Shuttered face plate for use with standard one gang back boxes. The RJ-45 socket features KATT IDC interconnection blocks and complies to category 5,568B requirements. Contains a covered labelling facility for terminal identification and is supplied with fitting screws.



order code	price each 1-9	10+
CH36804	£4.20	£3.76

Multimedia Microphone

Model CMP202
A rectangular Omni-directional multimedia condensor microphone
- Comes with holder and built-in clip
- 20Hz to 16KHz frequency response
- Lead Length 2.4 metres with a 3.5mm plug



order code	price each
SB00837	99p

Multimedia Microphone

Model: CMP101
A circular Omni-directional multimedia condensor microphone
- Comes with holder and built-in clip
- 20Hz to 16KHz frequency response
- Lead Length 2.4 metres with a 3.5mm plug



order code	price each
SB00836	99p

IBM Desktop Microphone

The cable length is 2 metres and is terminated with a 3.5mm plug.

order code	price each 1-9	10+
SB00608	£1.29	£1.05

Multimedia Microphone

Use for Internet communication, presentations etc. Connects to any sound card or fax/modem. Ball socket allows microphone to be positioned for optimum response.

Technical Data

Directivity	Omni-directional
Sensitivity	-62dB±4dB (at 1kHz)
Frequency Response	100Hz to 10kHz
S/N Ratio	>40dB (at 1kHz)
Connection	3.5mm stereo jack plug
Base Dimensions	105x95mm (LxW) approx.
Cable Length	2m



Genius

order code	price each 1-3	4+
CH38777	£1.62	£1.42

Multimedia Microphone

Model Quickshot Qs-5838
Features
- Desktop design, adjustable angle
- On/off switch

ONLY £1.55

order code
SB01402

Headphones with Boom Mic

This unit is designed for use on voice control applications or other areas where voice input is required such as internet telephony.

Technical Data

Headphones:

Impedance	32Ω
Drive Unit	27mm mylar speaker
Freq. Response	20Hz-20kHz
Max. Input Power	50mW (PMPO)
Sensitivity	100dB @ 1kHz
Input Connection	3.5mm stereo plug with 1.8m cable

Boom Microphone:

Impedance	600Ω
Freq. Response	80Hz-12kHz
Output Conn.	3.5mm mono plug

order code	price each 1-4	price each 5+
CH01606	£4.65	£4.60

Multimedia Headset

A multimedia headset which combines a set of stereo headphones with a boom condenser microphone. An in-line volume control is included in the 1.8m cable, terminated in 3.5mm plugs.

Technical Data	Headphone	Microphone
Frequency response	20 - 18KHz	20 - 16KHz
Impedance	32 ohm	24 ohm

order code	price each 1-4	price each 5+
SB01384	£4.95	£4.10

AT Mini Case

- 200 Watt AT power supply with monitor power outlet
- 2 free 5.25" external bays
- 230V ac
- 2 free 3.5" external and 1 free internal bay
- 8 expansion slots
- Power and Reset switches on front panel
- Removable top
- Hard disk and power LEDs on front panel
- Dimensions: 180 x 335 x 420mm (WxHxD)

Contents Case, mains lead, pack of hardware

order code

SB01416



ONLY £20.50

AT Mini Case

- 200 Watt AT power supply with monitor power outlet
- 2 free 5.25" external bays
- 1 free 3.5" external and 2 free internal bays
- Power and Reset switches on front panel
- Hard disk and power LEDs on front panel
- Dimensions: 180 x 335 x 430mm (WxHxD)

Contents case, mains lead, pack of hardware

order code

SB01173



ONLY £20.50

AT Mini Case

Features:

- 200 Watt AT power supply without monitor power outlet
- 2 free 5.25" external bays
- 2 free 3.5" external and 1 free internal bay
- Power and Reset switches on front panel
- Hard disk and power LEDs on front panel
- 8 expansion slots
- Dimensions: 180 x 340 x 430 (WxHxD)mm

Contents: case, mains lead, pack of hardware

order code	price each
SB01455	£20.50



AT Mini Case

ONLY £20.50

- 200 Watt AT power supply with monitor power outlet
- 230V ac • 2 free 5.25" external bays
- 2 free 3.5" external and 1 free internal bay
- Power and reset switches on front panel
- Hard disk and power LEDs on front panel
- Removable top • 8 expansion slots
- Dimensions: 180 x 335 x 420 (WxHxD)

Contents

Case, mains lead, pack of hardware

order code

SB01418



Micro Size ATX Mini Case

- 150 Watt ATX power supply without monitor power outlet
- 4 expansion slots • 230/115V ac switchable
- Power and Reset switches on front panel
- 2 free 5.25" external bays
- 2 free 3.5" external and no free internal bays
- Hard disk and power LEDs on front panel
- Removable top
- Dimensions: 175 x 365 x 355mm(WxHxD)



ONLY £23.75

Contents Case, mains lead, pack of hardware

order code

SB01415

AT Midi Case

- 200 Watt AT power supply with monitor power outlet
- 3 free 5.25" external bays
- 1 free 3.5" external and 2 free internal bays
- Power and Reset switches on front panel
- Hard disk and power LEDs on front panel
- Dimensions: 180 x 380 x 430mm (WxHxD)

Contents case, mains lead, pack of hardware

order code

SB01174



ONLY £23.99

AT Mini Case

While Stocks Last

- Power, HDD and Turbo LEDs
- Power, turbo, reset and keylock switches
- Fitted with internal speaker
- All front bays covered with pop-out plastic plates and metal plates behind
- 2 x 5.25" bays (accessible from front)
- 3 x 3.5" bays (2 front,1 internal)
- 200W PSU with IEC connection for monitor
- 8 rear slots for expansion cards
- Power connection for motherboard, 3 x 5.25" type conn. and 1 x 3.5" conn.
- Security tag on rear for padlock, prevents cases being opened
- Supplied with assorted screws and keylock key
- Dimensions (HxWxD) 300x175x405mm

order code **CH42573**

price each 1-4	5+
£24.20	£20.79

ATX Midi Case

- 235 Watt ATX power supply with monitor power outlet
- 230/115V ac switchable • 3 free 5.25" external bays
- 2 free 3.5" external and 1 free internal bay
- Power and Reset switches on front panel
- Hard disk and power LEDs on front panel
- Removable sides
- 7 expansion slots
- Dimensions: 210 x 405 x 435mm (WxHxD)

Contents
Case, mains lead, pack of hardware

order code **SB01417**

ONLY £27.99

ATX Midi Case

Features:
- 235 Watt ATX power supply with monitor power outlet
- 230/115V ac switchable
- 3 free 5.25" external bays
- 2 free 3.5" external and 1 free internal bay
- Power and Reset switches on front panel
- Hard disk and power LEDs on front panel
- Removable sides
- 7 expansion slots
- Dimensions: 215 x 410 x 435 (WxHxD)mm

Contents: case, mains lead, pack of hardware

order code **SB01453**



Micro ATX Desktop Case

- 150 Watt ATX power supply without monitor power outlet
- 230/115V ac switchable • 2 free 5.25" external bays
- 1 free 3.5" external and 1 free internal bay
- Power and reset switches on front panel
- Hard disk and power LEDs on front panel
- Removable top • 4 expansion slots
- Dimensions: 360 x 145 x 420mm (WxHxD)mm

Contents: Case, mains lead, pack of hardware

order code **SB01429**



ATX Midi Case

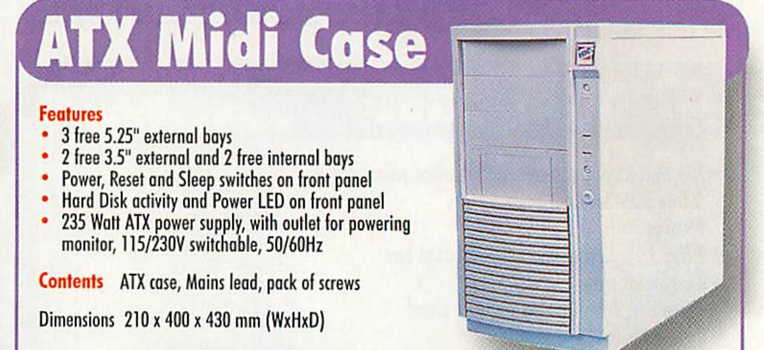
- 235 Watt ATX power supply without monitor power outlet
- 3 free 5.25 "external bays
- 1 free 3.5" external and 2 free internal bays
- Power and Reset switches on front panel
- Hard disk and power LEDs on front panel
- Removable sides
- Dimensions: 210 x 410 x 430mm (WxHxD)
- 8 Expansion Slots

Contents case, mains lead, pack of hardware

order code **SB01175**

price each 1-4	5+
£27.99	£24.99

ATX Midi Case



Features
- 3 free 5.25" external bays
- 2 free 3.5" external and 2 free internal bays
- Power, Reset and Sleep switches on front panel
- Hard Disk activity and Power LED on front panel
- 235 Watt ATX power supply, with outlet for powering monitor, 115/230V switchable, 50/60Hz

Contents ATX case, Mains lead, pack of screws

Dimensions 210 x 400 x 430 mm (WxHxD)

order code **SB00654**

price each **£46.35**

ATX Midi Case

- 235 Watt ATX power supply
- Has 3 free 5.25 " external bays
- Has 2 free 3.5" internal bays and 1 free 3.5" external floppy bay
- Power and reset switches, power and HDD LEDs on front panel
- Both case sides are removeable
- 7 expansion slots
- Dimensions: 240 x 405 x 450mm (WxHxD)

Contents Case, mains lead, screws and ATX mounting plates
Note No power socket for monitor

FROM ONLY £25.99

order code **SB00823**

price each 1-4	5+
£30.99	£25.99

ATX Midi Case



Features:
- 235 Watt ATX power supply with monitor power outlet
- 230/115Vac switchable
- 3 free 5.25" external bays
- 2 free 3.5" external and 2 free internal bays
- Power and Reset switches on front panel
- Hard disk and power LEDs on front panel
- Removable sides
- 7 expansion slots
- Dimensions: 205 x 420 x 445 (WxHxD)mm

Contents: case, mains lead, pack of hardware

order code **SB01454**

price each **£34.85**

IBM Aptiva Systems

FROM ONLY £449.00

LIMITED STOCKS

While Stocks Last

These systems are supplied complete with monitors (not upgradeable), mouse, speakers, cables and non IBM keyboards. All software is pre-installed (no windows disks supplied).

Model	IBM No	CPU	HDD	RAM	OS	Monitor	Graphics	Modem	CD	Sound	Case	Order Code	Price Each
Aptiva EP266	2138-E80	PII 266	4.0G	48M	Win95	15"	3D ATI AGP Rage Pro 4M	K56	24x	Crystal	MT	SB00868	£499.00
Aptiva SP266	2142-S36	PII 266	4.2G	32M	Win95	17"	3D ATI AGP Rage Pro 2M	33.6	24x	Crystal	MT	SB00870*	£515.00
Aptiva EK6	2137-E74	AMD K2 300	4.0G	48M	Win95	15"	3D ATI Rage II+ 2M	K56	24x	Crystal	MT	SB00872	£449.00

Note: Items supplied with each individual order code (type of monitor/speakers etc.) will vary from those pictured above.
Case Ref: MT=Mini Tower



**These systems are supplied in black & remaining items supplied in white as pictured*

FURTHER INFO AVAILABLE ON THE IBM WEBSITE WWW.PC.IBM.COM/SUPPORT

233MHz Notebook PCs

Choice of 2Gb or 3Gb internal hard drive

Model: SOYO PW9800

- Cyrix GXM-233 processor
- 32MB of EDO RAM, expandable to 128MB,with one free socket
- 8.2" DSTN LCD screen, 640x480 @ true colour
- Simultaneous LCD and CRT (up to 1024 x 768 depending on monitor) output
- Onboard 16 bit sound with built-in speakers and mic
- Internal Hard Drive - 2Gb or 3Gb available
- External 3.5" Floppy drive, using Parallel port
- External x24max CD ROM drive, using Ext IDE port
- LiON battery
- Windows keyboard (USA layout)
- Touchpad • PCMCIA sockets - 1 x type III or 2 x type II
- Interface/Connectors available: 1 x 9 way Serial, 1 x Parallel/Floppy, 1 x 15 way CRT, 1 x Mic in,1 x Headphone out, 2 x USB, IR port, 1 x Ext IDE/CD ROM socket
- AC adaptor: 100 - 240Vac input, 15Vdc 3.4A output

Description	Order Code	Price Each
Notebook PC no operating system, internal hard drive 2Gb	SB01427	£410.99
Notebook PC with Win'98 preloaded, internal hard drive 2Gb	SB01428	£462.45
Notebook PC no operating system, internal hard drive 3Gb	SB01470	£430.99
Notebook PC with Win'98 preloaded, internal hard drive 3Gb	SB01471	£482.45

Contents Notebook, Manual, AC Adaptor/Charger, Carry Case, 1 x Battery, Driver/Utility Disks

Optional Extra
- Modem - SB01239 • Battery - SB01433

Pentium® Multimedia Notebook

ONLY £549.00

While Stocks Last

Lightweight and portable - suitable for use in the home, office or car. Ready to use with external CD ROM and pre-loaded with MS Windows 95 and Lotus Smartsuite.

Unit includes
- Pentium® 120 CPU • 24Mb Ram • 810Mb Hard Drive • 8.4" TFT Colour LCD Screen
- External Floppy Drive • 1Mb of Video Memory • MS Windows 95 pre-loaded
- 20 speed External PCMCIA CD ROM - mains and battery
- UK Keyboard and trackpoint Mouse • Lotus Smartsuite pre-loaded - includes: 123 (Spreadsheet), Wordpro (Wordprocessing), Approach (Database), Freelance Graphics (DTP), Organiser (Electronic Diary) • Built-in Speakers

Contents
Notebook computer, 20 speed external PCMCIA CD ROM, AC adaptor 100/240V 50/60Hz 15Vdc @ 2.3A, 2 x Li-ion batteries - 7.2V 1200 mAH, external floppy drive. User instructions and 2 spare pointing stick rubber tops.

For replacement battery, order code BT01363

order code
SB00693

400MHz Laptop

While Stocks Last

Model CTX EzBook 700E Series
- AMD 400MHz K6/2 processor (upgrades n/a from CPC)
- 32MB of EDO RAM using 2 sockets, both used (upgradeable to 128Mb, n/a from CPC) • 512Kb level 2 cache
- 12.1" Active TFT LCD screen, up to 800 x 600@ 64K colours
- Simultaneous LCD and external CRT operation at 640 x 480
- PCI bus 128 bit GUI accelerator with 2Mb EDO RAM
- Removable 2.5" Hard drive of 3.9Gb, for extra data security
- Removable 3.5" Floppy drive
- Removable IDE x 24max CD ROM drive
- NiMH 12V 3.8AH battery can be installed in either CD-ROM or FDD bay
- Connectors available: 1 x 9 way Serial , 1 x Parallel, PS2 keyboard/Mouse, 15 way MIDI/Game, 15 way SVGA, Audio Line in/ Mic in/ Speaker out, IrDA, 2 x USB, 80 way Replicator socket and TV out
- PCMCIA slots (2 x Type II or 1 x Type III) The lower socket is ZV standard but both are Card Bus compatible
- Built-in Touchpad • Windows '98 keyboard (USA layout)
- Indicators for machine status of Battery level, Drive activity etc.
- 16 bit stereo sound with built-in mic and speakers
- Kensington Lock support • Dimensions: 230 x 297 x 48mm (WxDxH)
- Weight: 2.95 Kg

Contents:
Laptop, Manual, AC Adaptor / Charger, 1 x Battery & Driver / Utility CD

FROM ONLY £625.99

description	order code	price each 1-4	price each 5+
Laptop PC no operating system	SB01394	£639.99	£625.99
Laptop PC with Win'98 on CD	SB01410	£715.99	
Spare battery	SB01411	£70.99	
Carry Case	SB01445	£20.50	

Bare Bones PGA370 System

Features

- Shuttle Intel 810 chipset motherboard, PGA370 socket
- 48 speed CD ROM • 3.5" floppy drive
- Integrated 4MB video • AC'97 onboard sound
- Stylish ATX Midi tower case with 3 External 5.25" bays (2 free), 3 Internal 3.5" bays (1 free) ATX 250W power supply, no monitor power socket, 250V ac both sides are removable for easy access
- Heatsink and Fan for CPU • Dimensions: 440x230x350mm (DxWxH)
- Drivers for all video/audio/motherboard/supplied, booklet for motherboard and power lead

ONLY £162.75



Note: No HDD, keyboard, mouse, CPU or memory supplied

Options:

• Memory	32MB PC100 DIMM	SB00785
	64MB PC100 DIMM	SB00671
	128MB PC100 DIMM	SB00672
• CPU	Celeron™ 400MHz	SB00800
• HDD	8.4GB Samsung	SB00819
	12.9GB Samsung	SB01381
• PS2 Keyboard		SB00704
• PS2 Mouse		CS01471

order code **SB01419**

Bare Bones Socket 7 System

Features

- Shuttle SiS530 chipset motherboard, socket 7
- 48 speed CD ROM • 3.5" floppy drive • Onboard video
- Onboard sound • Stylish ATX Midi tower case with 3 External 5.25" bays (2 free) 3 Internal 3.5" bays (1 free) ATX 250W power supply, no monitor power socket, 240V ac both sides are removable for easy access
- Heatsink and Fan for CPU • Dimensions: 440x230x350mm (DxWxH)
- Drivers for all video/audio/motherboard/mouse supplied, booklet for motherboard and power lead

ONLY £149.50

Options:

• Memory	32MB PC100 DIMM	SB00785
	64MB PC100 DIMM	SB00671
	128MB PC100 DIMM	SB00672
• CPU	6x86 300	SB00682
	6x86 333	SB00806
	AMD K6/2 450	SB01136
• HDD	8.4GB Samsung	SB00819
	12.9GB Samsung	SB01381
• PS2 Keyboard		SB00704
• PS2 Mouse		CS01471

order code **SB01420**

Cyrix 300MHz Multimedia PC





Features

- Cyrix 300MHz CPU
- Shuttle 599 motherboard, with onboard sound and graphics
- 32Mb of RAM • 4.3Gb Hard Disk
- 3.5" floppy drive • 48x CD ROM drive
- PS2 keyboard and mouse • ATX Case
- Windows '98 preloaded (Win '98 supplied on CD)
- Drivers for all video/audio/motherboard/mouse supplied, booklet for motherboard

ONLY £333.75

order code **SB01443**

433MHz Multimedia PC



Features:

- Intel Celeron™ 433MHz CPU
- Shuttle AV61 motherboard
- 64MB of PC100 RAM • 8.4GB Hard Disk
- 3.5"floppy drive • 52X CD ROM drive
- 8MB SiS AGP video card
- Creative Labs PCI 128 soundcard
- ATX Midi tower case
- PS2 keyboard and mouse
- Windows '98 preloaded (Win '98 supplied on CD)
- Drivers for all video/audio motherboard/mouse supplied, booklet for motherboard

order code **SB01458**

ONLY £399.00

P200MMX Desktop PC
Manufactured by Daewoo-Unbadged

LAST FEW REMAINING

Specifications

- 3.5" floppy drive
- 16Mb of EDO RAM, with 2 free slots
- 1 DIMM slot Minimum 1.2Gb hard disk drive
- PS2 keyboard • PS2 mouse
- Motherboard with 3 free ISA and 3 free PCI slots, 1 x parallel and 2 serial ports Award BIOS, Plug and Play, power saving features
- 2Mb PCI graphics card (not upgradeable further) Trident TGU19682, has feature connector, comes with Win 95/Win 3.1/OS2 drivers, 640 x 480 up to 16M colours 800 x 600 up to 16M colours 1024 x 768 up to 64K colours - at up to 75Hz
- Case size is 130 x 400 x 420 (HxWxD)
- Desktop case has 2 free 5.25" bays available, Female power connector for monitor
- Comes with Win 95 on CD ROM.







While Stocks Last

ONLY £249.99

description	order code
P200MMX Desktop PC	SB00585

PC Replacement (AT Type) Power Supplies

FROM ONLY £16.85

AT style PC power supplies for replacing faulty units or building into new cases. Input is via standard IEC connection with an IEC socket for monitor power. Outputs are 1 x motherboard, 4 x 5.25" type and 2 x 3.5" connectors. The unit has an on/off switch on a flylead for mounting on the case.

Technical Data

Dimensions (HxWxD)	86x150x140mm
Input voltage	115~230V ac 50/60Hz
Output Voltage	+5V, -5V, +12V, -12V
Approvals	UL, CSA, TUV, CE

order code	power rating	price each 1-9	10+
CH42894	200W	£18.38	£16.85
CH42898	250W	£19.12	£17.53
CH42901	300W	£30.66	£28.81



A range of NEW Multimedia PCs

All of the systems below are ready to run. They are supplied with:

- 3.5" floppy drive
- Win '98 pre-loaded (Win '98 supplied on CD)
- Drivers for all video/audio/motherboard/mouse supplied, booklet for motherboard
- 12 months warranty, return to base

Intel® Celeron™ 433MHz PC

- Intel® Celeron™ 433MHz Processor • Shuttle ME18 motherboard
- 64MB of PC100 RAM using 1 x DIMM
- 4.3GB UDMA Hard Disk • 52 speed CD ROM drive
- Integrated Intel® 810 video chipset • Integrated Yamaha sound
- Windows keyboard and mouse • Micro ATX case
- Case dimensions (WxHxD): 75x370x365mm

order code **SB01480** price each **£360.00**

AMD K6/2 500MHz PC

- AMD K6/2 500MHz Processor • Shuttle 591P motherboard
- 64MB of PC100 RAM using 1 x DIMM • 8.4GB UDMA Hard Disk
- 52 speed CD ROM Drive • 8MB Savage 4 graphics accelerator
- Soundblaster 128 soundcard
- Windows keyboard and mouse • Micro ATX case
- Case dimensions (WxHxD): 75x370x365mm

order code **SB01477** price each **£405.00**

Intel® Celeron™ 466MHz PC

- Intel® Celeron™ 466MHz Processor • Shuttle VIA chipset motherboard
- 64MB of PC100 RAM using 1 x DIMM • 10.2GB UDMA Hard Disk • 52 speed CD ROM drive
- 8MB SiS 6326 AGP graphics accelerator card • Soundblaster 128 soundcard
- 55.6 internal PCI modem • Windows keyboard and mouse • Micro ATX case
- Case dimensions (WxHxD): 210x405x435mm

order code **SB01478** price each **£415.00**

Intel® Celeron™ 500MHz PC

- Intel® Celeron™ 500MHz Processor • Shuttle VIA chipset motherboard
- 64MB of PC100 RAM using 1 x DIMM
- 13.6GB UDMA Hard Disk • 52 speed CD ROM drive
- 8MB SiS 6326 AGP graphics accelerator • Soundblaster 128 soundcard
- Windows keyboard and mouse • Micro ATX case
- Case dimensions (WxHxD): 210x405x435mm

order code **SB01481** price each **£450.00**

Intel® Pentium®III 500MHz Power PC

- Intel® Pentium®III 500MHz Processor • Shuttle VIA chipset motherboard
- 64MB of PC100 RAM using 1 x DIMM • 20GB UDMA Hard Disk
- 52 speed CD ROM drive • 16MB Savage 4 graphics accelerator card
- Soundblaster 128 soundcard • 55.6 internal PCI modem
- Genius multimedia keyboard and mouse • ATX case
- Case dimensions (WxHxD): 210x405x435mm

order code **SB01476** price each **£610.00**

Intel® Pentium®III 600MHz Power PC

- Intel® Pentium®III 600MHz Processor • Shuttle VIA chipset motherboard
- 128MB of PC100 RAM using 1 x DIMM
- 20GB UDMA Hard Disk • 52 speed CD ROM drive
- 32MB Savage 4 graphics accelerator card • Soundblaster 128 soundcard
- 55.6 internal PCI modem • Genius multimedia keyboard and mouse • ATX case
- Case dimensions (WxHxD): 210x405x435mm

order code **SB01479** price each **£675.00**

AMD Athlon 600MHz PC

- AMD Athlon 600MHz Processor • Shuttle Athlon motherboard
- 128MB of PC100 RAM using 1 x DIMM • 20GB UDMA Hard Disk • 52 speed CD ROM drive
- 32MB TNT2 M64 graphics accelerator • Soundblaster 1024 Live Value soundcard
- 55.6 internal PCI modem • Genius multimedia keyboard and mouse
- ATX case • Case dimensions (WxHxD): 210x405x435mm

order code **SB01483** price each **£680.00**

Intel® Pentium®III 500MHz Power PC with CD RW Writer

- Intel® Pentium®III 500MHz Processor • Shuttle VIA chipset motherboard
- 64MB of PC100 RAM using 1 x DIMM • 20GB UDMA Hard Disk
- 52 speed CD ROM Drive • 24 x 4 x 4 CD RW Writer
- 16MB Savage 4 graphics accelerator card • Soundblaster 128 soundcard
- 55.6 internal PCI modem • ATX case • Genius multi-media keyboard and mouse
- Case dimensions (WxHxD): 210x405x435mm

order code **SB01482** price each **£699.99**

Interactive World Atlas Software

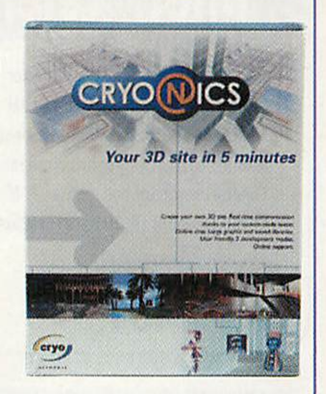
- Detailed Mapping - World 1:1 million
- World can be viewed at different levels of detail using zoom
- Use the powerful gazetteer to find any of over 150,000 places and geographical features
- 15 minutes of video • Over 1,200 photographs plus audio hot-spots
- Maps can be customised to suit requirements
- Extensive databases of information including country facts and figures and the world flags

Supplied on CD-ROM for Win 3.1 and 95

order code	price each 1-4	price each 5+
CH45884	£5.43	£5.35

Cryonics Internet Design Software

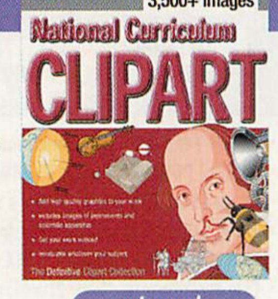
Easy-to-use software which enables users to create their own 3D websites in as little as 5 minutes. Using different themes, you can incorporate various designs, styles, images and music into your unique website.



- Designed to be used by both beginners or advanced web designers
- Generate your very own, personal 3D website
- Simple-to-use menu system to create your site in 5 minutes
- Invite friends to chat in your on-line rooms
- Choose from 5 individual themes (Contemporary, Exotic, Cartoon, Science Fiction and the Middle Ages)
- Hundreds of objects, furnishings, styles and musical pieces to use
- P90, 16MB RAM, 2MB Graphics Card, 8x CD-ROM, Sound Card, Modem and Internet Access

order code	price each 1-4	price each 5+
CH73074	£25.52	£23.55

GSP National Curriculum Clipart



- High quality colour and black and white images
- Easy to use - just copy and paste pictures into the documents
- Specially selected images to complement coursework across a range of subjects
- Contains fun images and speech bubbles
- Min.Sys.Req. : 486SX 33MHz or higher, Windows 95/98, 2MB HDD, 4MB RAM, CD-ROM Drive



order code	price each
CH69094	£13.74

CREATIVE Video Blaster Webcam GO

Portable WebCam which can be used remotely from the PC to take photographs. When returned to the PC, the images can then be downloaded to the hard drive.

When used as a desktop PC camera

- 24-bit, 16.7 million colours, live video capture rate up to 30 frames per second at a resolution of 352x288, and up to 15 frames per second at 640x480
- Supports still image capture 160x120, 176x144, 320x240, 352x288, and 640x480
- Focusable lens with a range of 152mm to infinity
- Snapshot button to capture an image and automatically display it on the PC screeen

When used as a portable camera

- 4MB of built-in RAM for image storage
- Optical viewfinder
- Monochrome LCD for displaying capture mode, approximate number of frames left in memory, and battery low indicator
- Detachable USB cable
- Powered by 2xAAA batteries (included) when detached from the PC

Full System

- Contents: USB Camera, Carrying Case, Wrist Strap, Software (Polaroid PhotoMAX, WebCam Monitor, Go Control, Microsoft NetMeeting 3.0/IE5, Media Ring Talk 99
- Min. Sys. Req.: P200, 16MB RAM, 70MB HDD, Spare USB Port, CD-ROM Drive, Modem, Sound Card

Technical Data

4 Image Capture Modes	Standard, Multi Exposure, Time Delay, Multi-Time Delay
4MB Non-Volatile Memory	Stores 90-460 JPEG images, depending on quality
CMOS Sensor	
Manual Focus Ring	Adjustable via PC
3 Position fixed focus lens	Infinity, Mid-Range, and Close Up
LCD Control Panel	Displays number frames left, mode indicator, low battery indicator
Optical Viewfinder	Helps to frame photographs

order code	price each
CH72223	£112.76

Site Construction Set Web Design Package

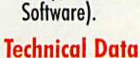
- Enables users to create and maintain interactive, real-time 3D websites
- Demonstrate/Visualise product in 360° 3D
- Provides realtime interaction with customers
- Site monitoring facilities
- Site map facility
- Add on-line games to your site
- Questions can be asked and answers recorded with the quiz module
- Chat modules for real-time chat on the web site
- Graphic library includes over 1200 objects and 6000 textures
- Fully compatible with 3D studio; users can import their own designs from 3D studio
- Incorporate a wide range of multimedia files - BMP, JPG, AVI, MPG, MOV, WAV, MID, RML etc
- Password, Security and specified-user restriction features
- Receive alerts when visitors perform specified actions on your site
- Monitor - frequency of visits, number of hits and number of simultaneous users
- Min. Sys. Req.: P133, 32MB RAM, 2MB Graphics Card, 2x CD=ROM, 28kbps Modem

order code	price each 1-4	price each 5+
CH73075	£136.17	£125.69



CASIO QV8000SX Digital Camera

- 2.5" high definition 'HAST' (122,100 pixels) colour LCD
- Extended zoom and macro facility
- USB connectivity
- Full automatic or manual control
- Multi function wired remote control
- DPOF (Digital Print Order Format) compliant
- Contents: 4x AA batteries, User's Guide, Soft Case, Strap, Video Cable, 8MB CompactFlash Card, PC Link Software).



Technical Data

Image Element	1/3" CCD 1.31 million pixels
Resolution	1,280 x 960 (SXGA) and 640 x 480 (VGA)
Lens	F3.2 - F3.5 Optical 8x Zoom f=6.2mm - 47mm Equivalent to 40 to 306 on 35mm camera
Monitor	Ultra-fine 2.5" HAST/ 122,100 pixels
Recording Format	Still: JPEG (Exif 2.1/DCF/DPOF) Movie: AVI
Recording Media	Compact flash card (Available up to 48Mb)
Video Out	NTSC or PAL selectable
Input/Output	Digital In and OUT, USB Jack (mini)
Image Storage	Fine (SXGA) 18 images Normal (SXGA) 36 images Economy (VGA) 291 images
Dimensions (HxWxD)	43x131x69mm
Weight	250g

order code **CH68558**

price each **£509.00**

OLYMPUS Camedia C-2020 Digital Zoom Camera

- Built-in 4.5cm colour TFT LCD monitor
- 12s delay timer function
- Built-in Flash
- 3x zoom for checking close up pictures
- Non-compressed TIFF images, Motion picture: QuickTime motion JPEG
- Flash modes - auto, red eye, fill in and flash off, slow synchronisation
- White balance - iESP full-auto TTL, manual (daylight, overcast, tungsten light (lamp), fluorescent light)
- Image effect - Sepia mode, black & white mode, black board mode, white board mode
- On screen information: Date and time, image quality modes, frame number, protection mark, remaining battery life
- DRAM technology for saving pictures quicker, saves time and batteries by taking shots at a fast rate
- Powered by 4xAA batteries (charger and Ni-MH batteries supplied)
- Supplied with a 3.3V 8MB Smartmedia card, 4xAA batteries and charger, Photoalbum 2.0 software for the PC and Mac (archives digital photographs)

Technical Data

Imaging Element	1/2" CCD (2.11M pixel)
Computer Output Images	640x480, 1024x768, 1600x1200 pixels
Lens	6.5-19.5mm (F2-2.8)
Aperture	Wide: F2-F11; Tele: F2.8-F11
Focus Range	0.2m - (infinity)
Connectors	DC input terminal, input/output (RS232C), Video output (PAL), external flash terminal
Weight	305g
Dimensions (HxWxD)	74x108x66mm

order code **CH72144**

price each **£553.18**

Document Shredder

Model Royal RS100

Features

- Accepts with paper widths up to 9⅜" (237mm).
- Shred width is ¼" (6mm).
- Up to 3 sheets can be fed at once.
- Auto or Manual start function with Auto shut-off.
- Reverse function. • Weight: 5.5lbs (2.5Kg).
- Shredding speed up to 16 feet per minute.
- Dimensions: 115 x 370 x 60mm (DxWxH).

While Stocks Last

Note: *No waste basket included.*
Contents: shredder, power supply (12Vac 60W) & user guide.

order code **SB00723** price each **£17.50**

Inkjet Refills

Made by Canon for Panasonic, supplied in original retail packaging, sealed from the factory. They are suitable for the following machines:

Canon	BJC4000, BJC4100, BJC4200, BJC4550, BJCC2500 & Canon Multipass
Apple	Stylewriter 2400 & Stylewriter 2500
Panasonic	KX-FA152
Packard Bell	KX-FA152

Pic. Ref.	Order Code	Description	Price Each
A	SB01407	UG-3504 Colour cartridge	£4.60
B	SB01408	UG-3505 Black cartridge	£3.10

JR INKJET Compatible Inkjet Cartridges

A range of compatible inkjet cartridges, manufactured to exacting standards to ensure first rate performance. The cartridges are listed to show compatibility and the equivalent OEM part number. In the table below Blk and Col indicate Black and Colour cartridges, respectively.

Compatible Cartridge for:	Compatible to:	oem part no	order code	1-4 price each	5+
Epson Stylus Colour Blk	Stylus Colour/Pro/Pro XL	S020034	CH39624	£3.85	£3.40
Epson Stylus Colour Col	Stylus Colour/Pro/Pro XL	S020036	CH39625	£6.66	£5.88
Epson Stylus Colour II Blk	Stylus 820/200 Colour II/Colour IIs/200	S020047	CH39627	£3.85	£3.40
Epson Stylus Colour II Col	Stylus 820/1500 Colour II/Colour IIs	S020049	CH39630	£6.66	£5.88
Epson Stylus Colour 300	Stylus 300	S020138	CH63370	£6.91	£6.13
Epson Stylus Colour 440/640/Photo 750Blk	Stylus 440/460	S020187	CH63374	£3.85	£3.40
Epson Stylus Colour 750 (Col.)	Epson Stylus Photo 750	S020193	CH68888	£7.13	£6.53
Epson Stylus Colour 900 (Blk.)	Epson Stylus Photo 900	T003011	CH68889	£3.97	£3.64
Epson Stylus Colour 900 (Col.)	Epson Stylus Photo 900	T005011	CH68890	£7.13	£6.53
Epson Stylus Colour 400 Blk	Stylus Colour 400/500/600/Photo	S020093	CH39631	£3.85	£3.40
Epson Stylus 200/500 Col	Stylus Colour 200/500	S020097	CH39632	£6.66	£5.88
Epson Stylus Colour 440/640/740 Col	Stylus 740	S020191	CH63372	£6.66	£5.88
Epson Stylus Colour 800 Blk	Stylus Colour 800/1520	S020108	CH39633	£3.85	£3.40
Epson Stylus Photo/700/EX Col	Stylus Photo/700/EX	S020110	CH63371	£6.91	£6.13
Epson Stylus Colour 740 Blk	Stylus 740	S020189	CH63373	£3.85	£3.40
Epson Stylus Colour 400	Stylus Colour 400/600/800/1520	S020089	CH39634	£6.66	£5.88
Canon BJC 4000 Blk	BJC 4000/Apple Colour Styl 2400	BCI-21 BLK	CH39638	£2.57	£2.27
Canon BJC 4000 Clr	BJC 4000/Apple Colour Styl 2400	BCI-21 C	CH39639	£3.85	£3.40
Canon BJC 600 (Cyan)	BJC 600/Apple Colour Styl/Pro	BJI-201 C	CH39647	£1.70	£1.49
Canon BJC 600 (Magenta)	BJC 600/Apple Colour Styl/Pro	BJI-201 M	CH39648	£1.70	£1.49
Canon BJC 600 (Yellow)	BJC 600/Apple Colour Styl/Pro	BJI-201 Y	CH39649	£1.70	£1.49
Canon BJC 600 High Capacity Blk	BJC 600/600e/Apple Colour Styl/Pro	BJI-201 HC	CH39650	£2.00	£1.81

BT Plain Paper Fax/ Copier & Speakerphone

Model BT Image 350

- Uses film and thermal printhead to produce 'non-fade' faxes
- ADF feeder for up to 5 sheets of A4
- Paper sizes:
  Width 210mm min - 216mm max.
  Length 150mm min - 600mm max.
- Scanning method: CIS
- Four resolutions and 3 contrast settings are available
- Delayed transmission, Fax re-dial and Fax-back functions.
- Communicates at 9600/7200/4800/2400 bps.
- Holds up to 50 sheets of A4 in receive tray.
- 200/240V 50/60Hz.
- 10 one touch dial memories and a 40 name directory memory. • Copy function.
- Answer machine connection. • Various reports are available to be printed.
- Handsfree telephone. • REN 1. • Dim: 280 x 220 x 280mm (WxDxH)



ONLY £129.99



Contents: Image 350, user instructions, line cord, ext. PSU 24Vdc @ 2.2A, film



order code
SB00879

XEROX Colour Printer

Model: DocuPrint C8

Features

- Colour printing using a 4 cartridge system, therefore only replace the colour that is empty
- Resolution of 600 x 600 dpi on plain paper, 1200 x 600 on photogloss paper
- Print speed of up to 5 ppm black, 2.5 ppm colour
- 100 sheet feeder (60 - 160gm/m²)
- Paper types: A4, A5, B5
  Envelopes: #10, DL, C6
  Banner paper: A4 x 5
- One year on-site warranty (UK)
- Drivers for Win '95, '98 and NT 4.0 (web download) and DOS (PCL3e compatible)
- Power: 100 - 240VAC • Weight: 4.5Kg
- Dimensions: WxHxD - 434 x 267 x 350mm

ONLY £59.99

Contents: Printer, driver on CD, cartridges - 2 x Black, 1 x Cy, 1 x Ma, 1 x Ye, mains lead, instructions and LivePix Deluxe 2.0
Requires printer cable, IEEE 1284 preferred, such as CS02705

Optional Extras - Replacement Cartridges

Black Compatible	SB01484	£4.99
Cyan Compatible	SB01485	
Magenta Compatible	SB01486	
Yellow Compatible	SB01487	
Black Original	SB01488	£10.65
Cyan Original	SB01489	
Magenta Original	SB01490	
Yellow Original	SB01491	

order code
SB01467

Combination Printer/ Fax/Scanner/Copier

ONLY £129.99

Model Olivetti OFX500L LinkFax

A plain paper inkjet combination Black/Colour Printer, Scanner, Copier, Telephone and Fax. The PC-Fax, Printer and Scanner functions are only available if the unit is connected to a PC's parallel port using the software supplied - LinkFax 10 (for Win 3.11/95).

Features

- Scans only in black, can be used as a stand alone fax machine. Also supplied with 1 disposable print head
- Uses standard A4 paper for printing/ copying and up to 40 sheets of 80gr/m² can be held. Max printable width is 208mm.
- Can use original documents from 148 to 216mm wide from 216 to 600mm length and up to 5 sheets of 60-90gr/m² or 1 sheet of 100-160gr/m² in the ADF.
- Communication speed from 2400 to 9600bps. • Manual/Auto fax reception. • REN 3.
- The size of received faxes can be reduced - 94%, 80%, 76% & 70%.
- Various reports on Fax activity available for printing.
- OneTouch (10 numbers) & SpeedDial (32 numbers) buttons are available on the Telephone and Fax modes.
- Contrast (normal/light/dark) and Resolution (Text/Photo) are available in Copier & Fax modes.
- Scanning resolution - 8 pixel/mm Horz, 3.85/7.7 lines/mm Vert.
- 21 page memory if consumables run out.
- The software supplied requires the following spec PC: For Win 95 - 486/66, 16Mb RAM, CD ROM drive. For Win 3.11 - 486/33, 8Mb RAM, CD ROM drive, DOS 5.00.

While Stocks Last

Power: 220/240VAC, 50/60Hz, 35W.
Dimensions: 264+84 x 359 x 193+138mm (DxWxH). **Weight:** 5Kg.
Contents: OFX500L, printhead storage box, telephone handset, parallel printer cable, black printhead, line cord, software (on CD ROM) and user guides.

Optional Extras: OL2784436 - Colour Printhead, Disposable,
OL2784431 - Black Printhead, Disposable,
OL2782070 - Printhead + 3 Cartridges,
OL2784433 - 2 x Black Cartridges.

order code
SB00781

Colourpage-Vivid Pro II

- 36 bit single pass colour flatbed scanner
- Parallel printer port connection
- 600 x 1200 dpi optical resolution, 9600 dpi interpolation resolution
- Scanning mode: Colour 36 bit, greyscale 12 bit, B/W 1 bit
- Supplied with iPhotoExpress, PhotoImpact SE and Recognita OCR software
- TWAIN support Win 95/98/NT
- Contents: Scanner, Connection cable, multi language electronic manual, Multi-language installation guide,Power adaptor, Software TWAIN driver
- Min. Sys Req: 486 or higher, 16Mb RAM, 100Mb HDD, Printer port, CD Rom drive

Genius®

order code
CH61768

price each 1-4	5+
£52.82	£49.04

Combination Printer/Fax/Scanner/Copier

Model: Olivetti OFX1100 Linkfax

A plain paper combination inkjet Printer/Scanner/Fax/Copier which can be upgraded to a colour printer by adding the OL2784436 printhead. The fax/copier functions can be used without being connected to a PC, whereas for the scan and printer functions a PC is required. LinkFax 8 software is supplied for the PC interface (Win 3.11/95).

Features:

- Uses standard A4 paper, 70 page hopper • Document feed for 10 sheets
- Comms speed 2400 - 9600bps • Manual/Auto Rx/Tx
- 21 page memory in case of paper out
- Will only scan in black and white
- 10 'One-touch' & 32 Speedial memory buttons
- Various reports available to print out • Power: 220-240V 50/60Hz
- REN3 • Weight: 6.3Kg • Dimensions (WxDxH): 325x420x230mm/ max with trays

ONLY £99.00

Contents: OFX1100, printhead storage box, parallel printer cable, black printhead, line cord, user guides and software on CD ROM.

OL2784436 Colour Printhead, disposable
OL2782070 Black Printhead & 3 cartridges
OL2784431 Black Printhead, disposable
OL2784433 Black cartridges (x2)

order code
SB01392



BT Plain Paper Fax/ Copier & Answerphone

FROM ONLY £154.50

Model BT Image 370

- Uses film and thermal printhead to produce 'non-fade' faxes
- ADF feeder for up to 5 sheets of A4
- Paper sizes:
  Width 210mm min - 216mm max.
  Length 150mm min - 600mm max.
- Four resolutions and 3 contrast settings are available
- Group dialling, Delayed transmission, Fax re-dial and Fax-back functions
- Communicates at 9600/7200/4800/2400 bps • REN 1 • Handsfree telephone
- 10 one touch dial memories and a 40 name directory memory • 200/240V 50/60Hz
- Various reports are available to be printed • Scanning method: CIS
- Digital Answer machine can store up to 15 minutes of messages (inc. OGM)
- A 40 page memory will retain received faxes if the paper runs out
- Holds up to 50 sheets of A4 in receive tray • Dimensions: 280x220x280mm (WxDxH)

While Stocks Last

Contents Image 370, user instructions, line cord, ext. PSU 24Vdc@2.2A, film.

Note: For replacement ink ribbon, order code TE02213

order code	price each 1-2	price each 3+
SB00788	£164.99	£154.50

olivetti JP192 Bubble Ink Jet Printer

- Compact versatile printer with two interchangeable printheads
- Can be used to print on a wide range of materials
- Ideal for printing photographic quality

Technical Data

Printing Technology	Bubble inkjet
Printing Speed	Up to 3 pages/minute
Line Length	80 columns at 10cpi
Fonts	30 resident bitmap fonts (portrait and landscape)
Character Attributes	Bold, Underlined, Superscript, Half Width, Half Length, Double Length
Pitch	5, 6, 8•24, 10, 12, 16•6, 20, 24, 33.3cpi
Print Resolution	600 x 300dpi
Emulations	PCL3+, IBM PP XL 24
Interface	Centronics Parallel
Paper Handling	Built-in automatic sheet feeder (40 sheets)
Paper Formats	A4, Letter, Legal
Noise Level	Less than 48dB (A)
Contents	Colour Printhead, Refillable Black Printhead, Monoblock Black Printhead
Dimensions (HxWxD)	165x376x200mm

order code	price each 1-2	price each 3+
CH66683	£66.94	£63.99

EPSON Stylus Color 760 Printer

- A4 size, black and colour inkjet printer
- Micro piezo print head technology 144 nozzles (black) and 48 x 3 nozzles per colour (Cyan, Magenta, Yellow)
- Bi-directional print direction with logic seeking

Characteristics
- Noise level: approx. 42dBA during printing
- Maximum Resolution: 1440x720dpi in black and colour
- Print speed A4 page: Varies from 8s to 109s (Depending on resolution) • Printer buffer: 256kB

Paper Handling
- 100 x A4 sheets (64g/m²) cut sheet feeder
- Paper size: A4, A5, A6, 4x6", 5x8", 8x10", Letter, B5, Legal, Panoramic (210x594mm)
- Envelopes: C6 (114x162mm), No. 10 (241x104mm) and DL (220x110mm)

Dimensions
- (HxWxD): 175x450x269mm • Weight: 5.8kg

Min.Sys. Req.
- 486, 16MB RAM, 10MB HDD, Windows 95/98/NT4

NEW

order code	description	price each 1-4	price each 5+
CH73865	Printer Epson Stylus 760	£151.35	£140.55
CH75275	Original Cartridges Black (S020189)		£15.49
CH75276	Colour (S020191)		£16.40



EPSON Stylus Color 660 Printer

FROM ONLY £99.99

- A4 size, black and colour inkjet printer
- Micro piezo print head technology 64 nozzles (black) and 32 x 3 nozzles per colour (Cyan, Magenta, Yellow)
- Bi-directional print direction with logic seeking

Characteristics
- Noise level: approx. 47dBA during printing
- Maximum Resolution: 1440x720dpi in black and colour
- Print speed A4 page: Varies from 12s to 120s (Depending on resolution) • Printer buffer: 32kB

Paper Handling
- 100 x A4 sheets (64g/m²) cut sheet feeder
- Paper size: A4, A5, A6, 4x6", 5x8", 8x10", Letter, B5, Legal, Panoramic (210x594mm)
- Envelopes: C6 (114x162mm), No. 10 (241x104mm) and DL (220x110mm)

Dimensions
- (HxWxD): 157x429x231mm
- Weight: 5.2kg

Min.Sys. Req.
- 486, 16MB RAM, 10MB HDD, Windows 95/98/NT4



order code	description	price each 1-4	price each 5+
CH73864	Printer Epson Stylus 660	£108.00	£99.99
CH75405	Original Cartridges Black (S020187)		£17.27
CH75276	Colour (S020191)		£16.40

EPSON Stylus Color 460 Printer



FROM ONLY £76.75

- A4 size, black and colour inkjet printer
- Micro piezo print head technology 64 nozzles (black) and 21 x 3 nozzles per colour (Cyan, Magenta, Yellow)
- Bi-directional print direction with logic seeking

Characteristics
- Noise level: approx. 47dBA during printing
- Maximum Resolution: 1440x720dpi in black and colour
- Print speed A4 page: Varies from 15s to 376s (Depending on resolution)
- Printer buffer: 10kB

Paper Handling
- 100 x A4 sheets (64g/m²) cut sheet feeder
- Paper size: A4, A5, A6, 4x6", 5x8", 8x10", Letter, B5, Legal, Panoramic (210x594mm)
- Envelopes: C6 (114x162mm), No. 10 (241x104mm) and DL (220x110mm)

Dimensions
- (HxWxD): 168x429x275mm • Weight: 5.2kg

Min.Sys. Req.
- 486, 16MB RAM, 10MB HDD, Windows 95/98/NT4



order code	description	price each 1-4	price each 5+
CH73863	Printer Epson Stylus 460	£80.04	£76.75
CH75405	Original Cartridges Black (S020187)		£17.27
CH75276	Colour (S020191)		£16.40





A Range of Hard Wired Switch Boxes

- All interface leads switched.
- Closed type switch
- Metal case
- Anti-skid feet to prevent movement
- Break-before-make mechanism
- Full shielding
- Female connectors as standard

order code	interface	no. of positions	price each 1-9	price each 10+
CH00913	DB25 female	2	£5.12	£5.08
CH00914	DB25 female	4	£7.78	£6.84
CH36597	DB25 female	X	£9.85	£9.20
CH01696	Centronics 36	2	£6.97	£5.55
CH01695	Centronics 36	3	£5.80	£5.29
CH01694	Centronics 36	X	£6.52	£5.96
CH01678	DB9 Female	2	£6.18	£5.89
CH01680	DB9 Female	4	£5.40	£4.89

Wall Mountable Parallel Switch Boxes





Model 211P

order code
SB01316
price each
£5.15



Model 411P

order code
SB01319
price each
£8.25



SB01316 - to connect 2 PCs to 1 printer. Dims: 105x95x30mm (DxWxH)

SB01319- to connect 4 PCs to 1 printer. Dims: 175x120x30mm (DxWxH)

These switch boxes operate on a "first come, first served" auto-switching function, no software required. They can also be switched manually via a switch on the unit. Time out period is set at 6 seconds.
All connectors are 25-way female, lead to PC is therefore 25-way M-M (CPC code CSLEAD104).
Supplied in retail boxes, with mounting screws and template.

PROVIEW 14" SVGA Monitor

Model: Proview Px-456

Features:

- 14" CRT (13.18" viewable) 0.28mm dot pitch
- Digital Controls via OSD (On Screen Display) for adjustment of: Size, Geometry, Bri/Contrast
- Horizontal Frequency: 30 - 54KHz
- Vertical Frequency: 50 - 120Hz
- Maximum Resolution: 1024 x 768
- Built-in microphone
- VESA, DPMS, LR, EPA, TCO 95 compatible
- Power: 100 - 240Vac 50/60Hz, 80 Watts
- Dimensions: (LxWxH) 384 x 359 x 371mm
- Weight: 11.0Kg

Note: the optional speakers in the user guide are not available from CPC.

Contents: monitor, user guide, mic lead & mains lead (to either 13A)



While Stocks Last

order code
SB01446

price each 1-4	5+
£79.99	£74.99

iMac Coloured USB Hubs

- 4 or 7 port USB hubs
- Auto bus/self-power selector
- Total working current (max): <100mA
- Supports Open Host Current Interface (OHCI) and Universal Host Controller Interface (UHCI)
- Operation Temperature: -0°C to 70°C
- LED indicator per downstream port
- Overcurrent protection
- Plug and Play
- Contents: USB Hub, 5m USB lead, Mains Adaptor
- Dimensions (HxWxD): 30x68x128mm

colour	order code	price each 1-4	5+
4 Port Hubs			
Black	CH72132	£28.35	£25.98
Red	CH72134	£28.35	£25.98
Blue	CH72129	£28.35	£25.98
7 Port Hubs			
Black	CH72137	£53.53	£49.07
Red	CH72139	£53.53	£49.07
Blue	CH72136	£53.53	£49.07

15" Digital Monitor

Model: Hyundai S560

Features:

- 15" CRT (13.7" viewable), 0.28mm Dot pitch
- OSD, Digital Controls for adjustment of - brightness, contrast, H/V size & position, trapezoid etc.
- Horizontal Frequency: 30 - 57KHz.
- Vertical Frequency: 45 - 130Hz.
- Resolution: 640 x 480 @ 85Hz up to 1280 x 1024 @ 60Hz
- MPR II, VESA, DPMS • Power: 90 - 264Vac, 90 Watts
- Dimensions: WxHxD - 365 x 370 x 386mm • Weight: 11.5Kg

Contents: Monitor, user guide & mains lead



order code
SB01461

TATUNG C5B 15" Digital Monitor

- 15" FST (13.7" visible) 279x210mm display area
- 0.28mm dot pitch
- Flat screen for better picture quality and less reflection
- 4 year on-site warranty
- Anti-glare tube with antistatic coating
- DDC ½ B PnP for simple installation and configuration

Technical Data

Screen Size	15" FST (13.7" visible)
Display Area	279x210mm
CRT Dot Pitch	0.28mm
Scan Rate	30-70kHz
Refresh Rate	50-120Hz
Properties	Anti-glare, antistatic, anti-reflection coating
User Controls	Contrast, Brightness, Size, Position, Pincushion, Trapezoid, Tilt
Max. Resolution	1024x768 NI 85Hz flicker-free
Features	Multi-sync, auto-sizing, full-scan, VESA power saving, DDC1/2B PnP, self-test pattern, universal power supply
Control System	Digital, with LED indicator or OSD
Low Radiation	MPRII
Power	240V ac
Dimensions	368x398x405mm (WxHxD)



order code	price each 1-2	3+
CH48694	£119.99	£117.99

17" Digital Monitor

Model: Hyundai S770

Features:

- 17" CRT (16" viewable), 0.27mm Dot pitch
- OSD with adjustment of - brightness, contrast, H/V size & position, trapezoid, zoom, parallelogram, corner pin, rotation, moiré, colour temperature, degauss
- Has controls on front for OSD, recall, power and zoom
- Horizontal Frequency: 30 - 70KHz.
- Vertical Frequency: 50 - 130Hz.
- Resolution: 640 x 480 @ up to 120Hz up to 1024 x 768 @ up to 85Hz
- TCO'92, VESA, DPMS, PnP • Power: 100 - 240Vac, 90 Watts
- Dimensions: WxHxD - 416 x 416 x 447mm • Weight: 16Kg



Contents: monitor, user guide
For mains lead use SB01148

ONLY **£138.00**

order code **SB01462**

17" Digital Monitor

ONLY **£139.99**

Model Hyundai DeluxScan 7770



Features

- 17" CRT (16" viewable), 0.27mm Dot pitch
- OSD (5 languages) Digital Controls for adjustment of - brightness, contrast, H/V size & position, trapezoid, zoom, parallelogram, moiré, degauss, rotation, recall, preset & colour temperature
- Horizontal Frequency: 30 - 70KHz
- Vertical Frequency: 50 - 150Hz • Weight: 16Kg
- Resolution: 640 x 480 @ 120Hz up to 1280 x 1024 @ 60Hz
- MPR II, VESA, DPMS • Power: 90 - 240VAC, 90 Watts
- Dimensions: WxHxD - 416 x 416 x 447mm

While Stocks Last

Note The optional speakers are not available from CPC

Contents Monitor, user guide & mains lead

order code **SB01157**

TATUNG C7T 17" Digital Monitor

A multi-frequency monitor which automatically adjusts its vertical and horizontal scanning frequencies to those of the host computer. The unit provides true colours, a high contrast range, vivid images and sharp text over the entire display area with accurate geometry adjustments.

4 Year on-site Warranty

- 0.28mm dot pitch • Full scan capability
- 17" (15.9" visible) flat-square colour monitor with excellent front of screen performance
- High resolution with high-refresh rate up to 1280x1024 at 60Hz
- All functions can be conveniently controlled by On Screen Display
- DDC ½ B PnP for simplified installation and configuration



For full technical data, see CS03810 on page 412 of CPC's Catalogue.

order code	price each 1-2	3+
CH48695	£186.65	£183.99

PROVIEW 19" SVGA Monitor

Model: Proview PK-998.

Features

- 19" CRT (17.9" viewable) dot pitch is 0.26mm
- Digital Controls via OSD (On Screen Display) for adjustment of -Size, Geometry, Colour temp (9300K or 6550K), Bri/Contrast.
- Horizontal Frequency: 30 - 98KHz.
- Vertical Frequency: 50 - 150Hz.
- Maximum Resolution: 1600 x 1200.
- Built-in microphone with output socket on rear.
- VESA, DPMS, LR, EPA, TCO 95 compatible.
- Power: 100 - 240Vac 50/60Hz, 150 Watts.
- Dimensions: LxWxH - 455 x 446 x 452mm. • Weight: 19.6Kg.

Note the optional speakers in the user guide are not available from CPC.

Contents monitor, user guide & mains lead (to either 13A or IEC320 plug).

order code **SB00812**

ONLY **£275.99**

TATUNG C9N 19" Digital Monitor

Featuring a large display area, high contrast range, superb image clarity and crispness, together with precise colour and accurate geometry adjustments this monitor is ideal for high-end CAD, desktop publishing and scientific workstation applications.



- 19" (17.9" visible) flat-square, anti-reflection, antistatic and anti-glare coated CRT
- High-resolution 0.26mm dot pitch
- On Screen Display provides an advanced selection of 18 digital controls which are conveniently displayed for colour and geometry adjustments
- Dual Video input selection: 5 BNC connectors and VGA D-sub connector (15 way HD D)



For full technical data, see CS03811 on page 412 of CPC's Catalogue.

order code **CH48696**

price each **£371.21**

Timed Internet Connection

The 'Timed Internet Connection' is a compact hardware device, which can be programmed to restrict the amount of time a user is connected to the Internet. It replaces the existing modem lead and contains a keypad, which can be programmed to prevent unauthorised access to the telephone line.



- Ideal for parents who wish to control their children's internet usage
- Prevents large telephone bills
- Replaces the existing modem lead (one end is connected to the modem and the other to the telephone wall socket).
- Detects when the allowed 'on-line time' has expired and automatically disconnects itself. (The allowed on-line time can be broken up into several divisions, i.e. a 1 hour period can be divided into 4 connections of 15 minutes or any other combination)
- Automatically begins the countdown as soon as internet connection is achieved
- Can be programmed to prevent the internet connection being resumed until an off-line time period has expired
- 4-figure PIN access number
- Warning signal indicates when only five minutes remain
- LED shows whether the unit has been tampered with
- Powered directly from the telephone line • 3m lead
- Keypad Dimensions (HxWxD): 21x62x117mm

ONLY **£33.99**

As featured in the Daily Mirror and on Radio 1's Newsbeat

order code **CH72734**

AZTECH PCI 3858 56kbps Modem Card

- 56kbps V90 PCI modem • Plug and play
- Line, Mic in, Line out sockets
- Contents: Modem, CD ROM, Telephone Cable, User Manual
- Min. Sys. Req.: P133, 8MB RAM, CD ROM Drive, Windows 95/98/NT 4



order code
CH72857

price each 1-4	5+
£30.38	£28.21

External 56K Modem

ONLY £42.50

An external 56K auto-detect K56Flex/V90 modem allowing users to add data facilities to a PC with no free internal slots, or where portability of a modem is required between machines.

Model H52PT-3020
- Error correction: V42, MNP 2-4. • Compatible with the following protocols: V34, V32bis, V22bis, V22A/B, V23, V21, Bell 212A, Bell 103. • Fax protocols: Group 3 send & receive. V17, V29, V27ter, V21. Command set 1 & 2.
- V80 and Rockwell Video Ready Synchronous access modes supported. • Data compression: V42bis, MNP 5.
- Power switch on rear. • Redial, pulse/tone dialling, Autoanswer, Hayes compatible. • AudioSpan (Simultaneous Audio/Voice/Data: SAVD) compatible. • Front panel LEDs and sockets for Mic and Speaker. • Ren 1. • Full duplex speakerphone mode.
- Sockets on rear for Serial connection (25-way D), DC power, telephone line and phone.
- Dimensions: 175 x 125 x 28mm (DxWxH).

Contents
External modem, user manual, serial cable (25 way to 25+9), driver software for Win 95/98/ NT4.0 on CD ROM, SuperVoice on CD ROM, telephone line cord, AC adaptor 9V ac 1.0A.

order code
SB00730

External 56K Voice/Data/Fax Modem

Model Wellink FM-56FT

- Full Duplex external Voice/Data/Fax Modem
- Speakerphone facilities using external speaker and mic • Compatible with Bell 212A/103,V22/22bis/32/32bis/34/34bis
- Uses CCITT V42/MNP2 -4 error correction
- Uses MNP5/V42bis data compression
- Tone & Pulse dialling
- Comes with Supervoice Comms software (Win 3.1/95/98/NT4.0)
- Dim: 125 x 45 x 230mm (WxHxD)

Contents Modem, software on CD, Ext PSU 9V ac @ 800mA , 9/25 way serial lead and Line cord.

FROM ONLY £36.99

order code
SB01369

price each 1-4	5+
£40.99	£36.99

External 56K/V90 USB Soft Modem

Model Wellink FM-56USB-ST
- Fully 'hot swappable', powered from USB port
- Uses the SGS Thomson chipset
- Compatible with Bell 212A/103,V22/22bis/32/32bis/34/34bis, K56flex, V90
- Group III fax compatible V17, V27ter & V29
- Uses CCITT V42/MNP2 -4 error correction
- Uses MNP5/V42bis data compression
- Video conferencing: H324, V80 compatible
- Comes with Supervoice Comms software (Win 98/NT4.0)
- Tone & Pulse dialling • Dim: 65 x 33 x 130mm (WxHxD)

System Requirements: Pentium 233MMX, 32Mb RAM, USB port & Win 98 / NT5.0

Contents Modem, software on CD/Floppy, user guide and Line cord.



order code
SB01368

ONLY £39.99

56K Internal Modem

An internal PCI bus 56K modem.
- Supports: V90, K56Flex, V34, V32, V22, V21, V23 Data & V17, V21, V27ter Fax
- V80 (H324 video conferencing)
- Comes with Supervoice • REN 1
- Voice/Audio mode
- Full duplex speakerphone
- Sockets on rear for external Mic and speaker via 3.5mm jack. Phone and Line RJ45 sockets.

System requirements: Win '95, '98 and P150 MMX processor or greater, 16MB RAM

Contents Modem, User Instructions, Line cord and CD ROM with drivers and software.




FROM ONLY £20.99

order code
SB00710

price each 1-2	3+
£24.60	£20.99

56K Internal Modem

Features
- 56K Data/Fax and Voice, inc Full Duplex speakerphone, internal modem • Supports Data modes - K56Plus/K56Flex (56Kbps), V34, V32/32bis, V22/22bis, V21, V23 • V24 MNP2-4 error control and V42bis MNP5 data compression
- Compatible with Hayes AT command set
- Fax Class 1 command set
- Group III send/receive up to 14,400 bps
- Supports fax modes V17, V27ter, V29, V21
- Sockets on rear for mic in and speaker out using 3.5mm sockets • Onboard speaker • Line in and telephone out sockets using RJ11 • Detects if Data/Fax or Voice incoming call
- Answerphone facility via software • REN is 1



Contents Modem, line cord, software - 'Supervoice' on CD ROM & Win 95/98 & NT4 drivers supplied on floppy, user guide

Technical Data System requirements: IBM compatible 386 or higher, with free 16 bit ISA slot. Win 3.1/3.11 or Win 95

order code
SB00578

price each 1-4	5+
£43.25	£40.99

AZTECH V90 External Modem

- 56kbps V90 modem
- Full duplex speakerphone for hands-free operation
- Full software bundle to give integrated telephony features
- Microphone, speaker jack socket
- Built-in 4MB flash ROM
- Modem Dimensions (HxWxD): 28x138x110mm
- Contents: Modem, CD ROM, Telephone Cable, Serial Port Cable, Mains Adaptor, User Manual
- Min. Sys. Req.: 486, Spare Serial Port, 8MB RAM, CD ROM Drive, Windows 95/98/NT 4



order code
CH72865

price each 1-4	5+
£46.08	£42.79

PCMCIA 56K Fax Modem

Features
- PCMCIA type II full Duplex Fax/Modem
- Compatible with Bell 212A/103,V22/ 22a/22bis/23/32/32bis/34/34 plus • Group III fax compatible V17/29/27ter & V21 • Uses CCITT V42bis/MNP5 Data compression • Tone & Pulse dialling
- Manual or Auto operation

Contents
Modem, Supervoice on CD and Line cord



ONLY £46.35

order code
SB01239

CREATIVE ModemBlaster Flash 56 External Modem

- Supports both K56 flex and ITU 90
- Upgradeable flash ROM (from www.creative.com)
- V80 video conferencing
- CTR21
- Enhanced AT command set, Class 1/Class 2 fax commands, Group 3 send/receive fax
- Contents: External Modem, Manual, Phone Cable, RS232 Cable, Mains Adaptor, Communication Software (IE5, Media Ring Talk'99, Internet Access Software), Windows 95/98/NT drivers
- Min. Sys. Req.: 486DX, 8MB RAM, 25MB HDD, Windows 3.x/95/98, CD-ROM Drive



order code	price each
CH72224	£54.12

AZTECH PCI 3880 56kbps Modem Card

- 56kbps V90 PCI modem
- Plug and play
- Line, Mic in, Line out sockets
- Contents: Modem, CD ROM, Telephone Cable, User Manual
- Min. Sys. Req.: P233, 8MB HDD, 16MB RAM, CD ROM Drive, Windows 95/98/NT 4



order code	price each 1-4	5+
CH72864	£22.29	£20.70

8 bit Bi-Dir Parallel Card

1xhi-speed bi-directional printer port I/O address: LPT1/2/3/4/5/6 IRQ 5/7

order code	price each 1-4	5+
CH36595	£6.75	£6.18

Super I/O Cards

CH34631: ISA IDE/FDC/2 x Serial/ 1 x ECP/EPP/SPP
- Chipset: ACC Micro ACC3223
- IDE: 2 hard disk controllers with buffer, disable/enable
- Floppy disk controllers x 2, disable/enable
- Serial (UART): 2 x high speed UART with FIFO UART1:I/O address COM1/2/3/4, IRQ 3/4/5/7/9/10/12/14/15, disable/enable
- UART2: As1
- Printer Port: 1 x ECP/EPP/SPP, I/O address: LPT1/2/3. IRQ 3/4/5/7/9/10/11/12/14/15

CH34632: ISA IDE/FDC
- Chipset: ACC Micro ACC3223
- FDC 2 x FDC disable/enable
- IDE: 2 x HDC with buffer select primary/secondary, disable/enable

(CH34632 pictured)

order code	price each 1-4	5+
CH34631	£13.09	£10.14
CH34632	£10.64	£9.75

8 bit ECP/EPP/SPP Port x 1 Card

- One port ECP/EPP/SPP/Bi-directional parallel port
- Chipset: ACC3203
- I/O address: LPT1/2/3/4/5/6. IRQ 5/7
- Uses 8 bit ISA slot

order code	price each 1-4	5+
CH36594	£10.42	£9.75

ISA 1/2 Printer Ports ECP/EPP/SPP I/O Card

CH36592: 1 ECP/EPP/SPP Port with bi-dir
CH36593: 2 ECP/EPP/SPP Ports with bi-dir

- Chipset: HT-6535
- Printer port: HP-ECP/IBM-EPP printer port, bi-directional with 16 byte FIFO
- Printer port 1: Supports 6 I/O addresses 3BC/378/278/268/27C/26C, Supports 9 IRQ locations 3/4/5/7/9/10/11/12/15, Supports DRQ 1/3, Supports DACK 1/3
- Printer port 2: As 1

order code	card type	price each 1-4	5+
CH36592	1 parallel port	£13.20	£13.05
CH36593	2 parallel port	£19.65	£17.99

AZTECH PCI 168 Audio Card

- Built-in 3D sound effects
- Plug and play
- Supports DirectSound and DirectSound 3D
- Full duplex audio drivers, enabling full duplex speakerphone capability
- Plug and play
- Contents: Sound Card, CD ROM, User Manual
- Min. Sys. Req.: P100, 10Mb HDD, 16Mb RAM, CD ROM Drive, Windows 95/98/NT 4

order code	price each 1-4	5+
CH72853	£11.62	£10.79

4 Channel PCI Sound Card



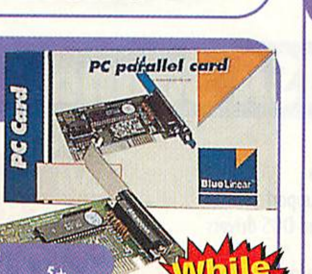
- 4 channel surround sound
- 3D positioning
- Yamaha 744 chipset
- DLS wavetable synthesizer
- 16 bit sampling
- Software emulation of sound blaster pro
- Outputs: Front and rear line out, Inputs: Line in, Mic
- MIDI Interface/Joystick port
- Contents: CD Driver Disc, Instruction Booklet, Sound Card

Only supports amplified speakers.

order code	price each 1-9	10+
CH65750	£22.71	£20.82

Parallel Card

A bi-directional parallel card that can be used as an additional parallel port (EPP). The card slots into a spare ISA slot and can be configured by jumpers for different addresses.



order code	price each 1-4	5+
CH01682	£9.41	£9.20

While Stocks Last

ISA 2 x Serial, 1 x Parallel I/O Card

- 2 x hi-speed UART with FIFO/Hi-IRQ(3-15)/Hi-COM(1-8)
- 1 x SPP with FIFO/Hi-IRQ(3-15)/Hi LPT(1-6)
- RS232: 2 x ST-16C552 UARTs supporting Hi-IRQ and Hi-I/O address
- UART1: I/O address COM/1/2/3/4/5/6/7/8, IRQ location 3/4/5/7/8/10/11/12/15
- UART 2: as 1
- Printer port: 1 x SPP, bi-directional with FIFO ST-78C34/36, supports Hi-IRQ and Hi-I/O address
- Print Port1: I/O address LPT1/2/3/4/5/6, IRQ location 3/4/5/7/9/10/11/12/15

order code **CH36590**

price each	1-4	5+
	£20.25	£18.55

4MB PCI SVGA Card

ONLY £21.65

- Uses the SiS 6326 chipset
- Onboard 4MB memory (not upgradeable)
- PCI slot required
- Has feature connector
- Supplied with drivers on CD ROM for Win 3.1/95/98/NT 3.5/4.0/5.0



order code **SB01468**

AZTECH Full Power Multimedia PCI 288 Q3DII 3D Audio Card

- 32 bit PCI audio accelerator
- Compatible with EAX™ using Qsound® environment modelling™ (QEM™)
- Studio quality 3D positional audio via 2 or 4 speakers
- 320 voice wavetable synthesis
- RCA S/PDIF connection to external audio/video equipment
- Contents: Sound Card, CD ROM, User Manual
- Min. Sys. Req.: P166 MMX, 20MB HDD, 32MB RAM, 2x CD ROM, Windows 95/98/NT 4



order code **CH72854**

price each	1-4	5+
	£22.69	£21.07

PC Colour Vision Kit

While Stocks Last

The hardware in this kit when combined with the award winning video conferencing software 'Vocaltec-Internet Phone 4.0' will allow long-distance voice and video communication for the cost of an Internet connection.

Features
- Colour Camera
- Supports full screen or a scaleable window
- Still or Full Motion video capture
- External composite and s-video inputs
- Supports colour depth of 15,16,24 or 32 bit
- Adjustable brightness, contrast, saturation and hue
- Free PCI slot required, PnP supported
- Win 95 drivers
- No VGA feature connector required
- Camera spec:
  Pixels - 27,000
  Lens - 4mm, F3.8, fixed iris
  Focusing - manual
  Object distance - 10mm to infinity
  Video signal - Composite
  Shutter speed - up to 1/2000 sec
  Illumination - 10 lux min



Contents Vid-com card, Camera, Mic and software

order code **SB01326**

ONLY £61.99

SCV6 ISA Sound Card

ONLY £5.15

Features
- Creative ViBRA 16XV VLSI 16 bit chip set
- Plug and play • Soundblaster 16 compatible
- Integrated frequency synthesizer
- Stereo enhancement support
- Dynamic filtering for audio playback and record
- Full duplex DMA enabling 8 and 16 bit data record and playback
- 5kHz to 48kHz variable sampling rate
- Built-in creative stereo enhancement

While Stocks Last

Note **To be used only with 'Tomato' motherboards with 10 way socket**

Contents ISA Soundcard, CD-ROM Disk, 10-pin flat cable

order code **SB01251**

ALS100+ 3D ISA Sound Card

While Stocks Last

Features
- Uses Avance Logic ALS100 Plus+ chipset
- 20 voice FM synthesis • Onboard amp, 2W per channel
- 8 & 16 bit, mono & stereo record and playback
- Sample rates to 48KHz. • Full Duplex support
- MPU401 compatible interface
- Wavetable connector
- Connectors on rear: Line Out, Line In, Mic In & Joystick/MIDI
- Compatible with the following standards: Adlib, SB Pro, SB16, Waveblaster, General MIDI & Plug & Play
- Windows 3.1, 95, NT 4.0 and DOS drivers

Note There is no IDE connector

Contents Soundcard and drivers/manual on CD ROM



order code **SB01244**

ONLY £6.20

ALS200 3D Wavetable ISA Sound Card

Features
- Uses Avance Logic ALS200 chipset • 20 voice FM synthesis • Onboard hardware Wavetable
- 8 & 16 bit, mono & stereo record and playback • Sample rates to 48KHz. • Full Duplex support
- Connectors on rear: Line Out, Line In, Mic In & Joystick/MIDI • Windows 3.1, 95, NT 4.0 and DOS drivers
- IDE connector • MPU401 compatible interface • Onboard amp, 2W per channel
- Compatible with the following standards: Adlib, SB Pro, SB16, Waveblaster, General MIDI & Plug & Play

Contents Soundcard and Drivers/Manual on CD ROM





order code **SB01245**

price each **£7.20**

Socket 7, AT/ATX Motherboard

While Stocks Last

Model: Powerboard P586 TX

- Intel 430TX PCI chipset
- Intel Pentium® processor operating up to 233MHz and MMX (P54C/P55C), AMD K5, K6, Cyrix 6x86MX, 6x86L, M2 with 321 ZIF socket 7 and scalability to accept faster processors
- Supports up to 256MB DRAM (minimum 8MB) or FP, EDO or SDRAM
- 4 x 72 pin SIMM slots, 2 x 168 pin DIMM slots
- 4 x PCI slots, 3 x ISA slots, 2 x IDE devices
- Onboard burst/pipelined burst synchronised cache supported • Ultra DMA 33
- Supports 1 x floppy, 1 Parallel (EPP, ECP port) and 2 Serial Ports (16550 fast UART compatible)
- Both PS/2 and AT style keyboard connectors supported (PS2 connector not supplied)
- CPU hardware sleep and SMM • USB, IrDA/ASK IR port and modem ring and wake up suspend
- Power connector is AT/ATX type

Contents Manual, CD Driver Disc, 1 x floppy drive cable, 1 x HDD cable, Serial and Parallel back plate

order code **SB01298** price each **£19.99**

Socket 7, ATX Motherboard



Model: Crusader C586 TXA

System board is equipped with a 321 pin ZIF socket (Intel socket 7). Designed to be easily upgraded. The system board is also equipped with a switching voltage regulator that supports 2, 2.1, 2.8, 2.9, 3.2, 3.3 and 3.5V core voltages.

- Intel 82430TX PCI chipset
- Supports Intel Pentium® Processor with MMX technology 166/200/233MHz; P90-200MHz Cyrix 6x86L PR150+/PR166+, AMD K5 PR90-PR166, AMD K6 166-233
- Supports 8MB to 256MB • 2 x 168 pin DIMM slots, 4 x 72 pin SIMM slots
- 512kB pipeline burst cache • 3 x PCI slots, 3 x ISA slots, 1 shared PCI/ISA
- On board I/O: 1 x serial port, 1 x parallel port, 1 x PS/2 keyboard port and 1 x PS/2 mouse port
- Ultra DMA/33 • 2 x USB ports • Hardware supports SMI green mode • IrDA interface
- DMI interface to warn of motherboard problems • Modem wake-up, ring-on
- ATX power supply connector • Windows 95, Plug and play compatible

While Stocks Last

Contents Manual, Driver Disk, 1 x floppy drive cable, 1 x HDD cable, 5 x Jumpers

order code **SB01295** price each **£20.60**

Socket 7 AT Motherboard

Model Powerboard P586VX

Features

- CPU Support (Socket 7) Intel Pentium® MMX166 - 233MHz, Pentium® 75 - 200MHz AMD K6 PR166 - PR233, K5 PR75 -PR 200 Cyrix/IBM 6x86 M1 P120+ - P200+, 6x86L M2 P120+ - P200+
- Manual jumpers for CPU set up
- TX chipset Voltages from 2.8 - 3.52V and clock speed from 50 - 83MHz
- Uses the Intel SB82437VX chipset
- Onboard cache of 512Kb Pipelined Burst SRAM
- 1xDIMM (3.3V SDRAM/EDO unbuffered) and 4xSIMM (5V FPM/EDO) sockets available supporting up to 128MB of RAM. Note only 1xDIMM & 2xSIMM at once
- Award Bios • 4 x PCI, 3 x ISA slots • 2 x IDE ports supporting up to PIO mode 4
- 1 x 9 way and 1 x 25 way Serial ports, 1 x Parallel port, 1 x AT Keyboard port
- Power connector is AT type • Dimensions: 220 x 220mm



While Stocks Last

Contents Drivers for motherboard, booklet for motherboard, 1 x floppy drive cable & 1 x hard drive cable, Serial & Parallel backplate

order code **SB01301**

ONLY **£20.60**

Slot 1 LX Motherboard

Features

- CPU Support (Slot 1) Intel Pentium® II 233MHz to 333MHz
- Uses the Intel FW82443 AGP LX chipset
- 3 x DIMM (3.3V SDRAM/EDO/FPM unbuffered) supporting up to 348MB of RAM
- Award BIOS
- 4 x PCI, 3 x ISA & 1 x AGP slot
- 2 x IDE ports supporting up to PIO mode 4 and UDMA33 support
- Floppy interface, LS120 supported
- USB & IR supported (no connectors supplied)
- 2 x 9 way serial ports, 1x parallel port, 1x PS2 keyboard & PS2 mouse port
- Power connector is ATX type
- Dimensions: 350 x 190mm



Contents
Drivers for motherboard, booklet for motherboard, 1 x floppy drive cable and 1 x hard drive cable and retention clip

order code **SB01293** While Stocks Last price each **£23.65**

SoundBlaster Live! Value





This card incorporates Creative's 'Environmental Audio' standard, which gives any supporting software sound quality so good it has to be 'Live'!

Features

- Uses the EMU10K1 synthesis chip • Up to 192 voice wavetable synthesis • 3D sound from two speakers • Full Duplex support
- Support for Directsound3D and Directsound in 2 and 4 speaker modes with compatible software. Environmental Audio supported
- Real time digital effects such as reverb, chorus, pitch shifter
- User selectable DSP mode to simulate Hall, Theatre etc. • 8 & 16 bit , mono & stereo record and playback
- 48 MIDI channels, 128 GM/GS compatible instruments & 10 drum kits • Connectors on rear: Front Line out/Speaker Out, Rear Line Out, Line In, Mic In & Joystick/MIDI
- Sample rates from 8 to 48KHz • Compatible with the following standards: General MIDI, MPC-3, MPU401, Plug & Play, Directsound, Directsound3D.
- Connectors on board: Aux in, Digital CD in, analogue/MPC-3 CD in, telephone in. • Uses up to 32B of system RAM for wavetable samples

Minimum requirements PCI free slot with 133MHz Pentium processor, 16MB RAM (32Mb for NT), Windows 95/98 or NT 4.0

Contents PCI Live! card, driver & applications on CD ROM, digital & analogue audio CD cable.

ONLY **£61.99**

order code **SB00815**



Slot 1 ATX AT Motherboard

Model Tomato 6DLX

Features
- CPU Support (Slot 1), Intel Pentium® II 233MHz to 333MHz
- CPU 'Autodetect' setup • 4 x PCI, 2 x ISA & 1 x AGP slot
- Uses the Intel FW82443 AGP LX chipset • Floppy interface
- Connectors on board for SB-Link, TB-link and Wakeup-Link
- 3 x DIMM (3.3V SDRAM/EDO/FPM unbuffered) supporting up to 512MB of RAM
- Ami Bios
- 2 x IDE ports supporting up to PIO mode 4 and UDMA33 support
- Power connector is AT/ATX type
- 1 x 9 way and 1 x 25 way Serial ports, 1 x Parallel port, 1 x AT Keyboard & PS2 port
- USB & IR supported (no connectors supplied) • Dimensions: 220 x 220mm

While Stocks Last

Contents Drivers for motherboard, booklet for motherboard, 1 x floppy drive cable & 1 x hard drive cable, Serial, Parallel & PS2 backplates and retention clip

order code	price each
SB01292	£23.60

Slot 1 ATX Dual Motherboard

While Stocks Last



A Pentium® II motherboard which uses slot 1 and slot 2 to support dual processors from 233 - 333MHz. Provision for virus free operation is catered for by means of Onboard BIOS protection features and copy of 'PC-cillin' being supplied.

- Supports upgradeable I/O APIC module to operate dual Pentium® II processors
- Intel i440LXi chipset
- 4 DIMM sockets which support EDO/SDRAM memory up to 512Mb using 8/16/32/64/128 Mb DIMMs
- Supports Ultra DMA/33 and ACPI, Mode 0 to 4, for x4 Hard drives up to 8.4Gb
- Has AGP (Accelerated Graphic Port) v1.0
- Multi I/O supports 2 x Serial ports at 16550, 1 x Parallel with ECP and EPP, floppy & PS2 interface, USB and Infra Red support
- Uses AMIBIOS
- 4 x PCI, 3 x ISA and 1 x AGP slots
- Connectors mounted to PCB as follows: 2 x PS2 (mouse and keyboard), 2 x USB, 1 x Parallel and 2 x 9 way Serial
- ATX power connector, with support for ACPI and Legacy PMU
- Dimensions: 220 x 305mm (ATX style)

Contents
Motherboard, User Instructions, 1 x HDD - 1 x FDD cable, PC-cillin on CD ROM, drivers on CD ROM, 1 x CPU holder.



order code	
SB00635	ONLY £39.00

Optional Extra

description	order code	price each
APIC Module	SB00661	£14.99

Slot 1 ATX Motherboard

Model: Crusader P2 XLX

Features
- CPU support (slot 1) in SEC package, Intel Pentium® II 233MHz to 300MHz
- Uses the Intel FW82443 AGP LX chipset
- 3 x DIMM (3.3V SDRAM/EDO/FPM unbuffered) supporting up to 348MB of RAM
- Award BIOS, NCR810 SCSI compatible
- 4 x PCI, 3 x ISA and 1 x AGP slot
- Floppy interface, LS120 & Zip supported
- USB & IR supported (no connectors supplied for IR)
- 2 x IDE ports supporting up to PIO mode 4 and UDMA33 support • PC'97 compliant
- 2 x 9 way serial ports, 1 x parallel port, 2 x USB, 1 x PS2 keyboard and PS2 mouse port
- WOL Wake-on-Lan connector • Power connector is ATX type • Dimensions: 305 x 210mm

Note: Motherboard supplied may have a different layout to the one pictured

Contents
Drivers for motherboard, booklet for motherboard, 1 x floppy drive cable and 1 x hard drive cable and retention clip



order code		price each
SB01337	Great Value	£22.65

Socket 7, AT/ATX Motherboard

Features
- Shuttle Space Walker HOT-591P board
- CPU support (Socket 7) Intel Pentium® MMX166 - 233MHz, Pentium® 90 - 200MHz, AMD K6-2 266 - 400MHz, K6 166 - 266, K5 90 - 166MHz Cyrix/IBM 6x86MX 166 - 266, 6x86 (L) 150+ -200+MHz, IDT-C6 150 - 200MHz
- Either CPU 'Plug and Play' or manual jumpers for set up, Voltages from 2.0 - 3.52V and clock speed from 60-100MHz
- Uses the VIA VT82C598MVP/VT82C586B chipset
- Onboard cache of 512Kb Pipelined Burst SRAM
- 2 x DIMM (3.3V SDRAM/EDO) or 2 x SIMM (5V FPM/EDO) sockets available supporting up to 256MB of RAM. Note: cannot use SIMM and DIMM simultaneously
- 2 x IDE ports supporting up to PIO mode 4 and UDMA33 • 1 x AGP, 4 x PCI, 3 x ISA slots
- 1 x 9 way and 1 x 25 way Serial ports, 1 x parallel port, 1 x AT keyboard port • Award BIOS
- Power connector is either ATX or standard AT type • Dimensions: 220 x 220mm

Contents Drivers for motherboard, booklet for motherboard, 1 x floppy drive cable and 1 x hard drive cable, serial and parallel backplate

order code	price each 1-4	price each 5+
SB00826	£53.50	£51.50

PGA370 ATX Motherboard with Sound & Graphics

Model SpaceWalker ME17

Features
- CPU Support (Socket PGA370), Intel Celeron™ 266/66 to 500+/66 MHz, Intel Celeron™ 500+/100MHz
- Jumperless CPU set up
- Intel 810 chipset with integrated 2D/3D AGP graphics engine and AC97 sound controller (AD1881)
- 2 x DIMM (3.3V SDRAM unbuffered) sockets available supporting up to 512MB of RAM
- Award Bios V6.0 PG on Intel Firmware Hub with 4Mb flash core, supports Green PC, DMI and NCR SCSI BIOS
- 3 x PCI slots, 1 x AMR and 1 x UPT slot
- 2 x IDE ports supporting up to PIO mode 4 using UDMA 33/66
- 1 FDD port, LS/ZIP bootable
- 2 x 9 way Serial ports, 1 x Parallel port, PS2 mouse and keyboard, 2 x USB port and IR port compatible. VGA output, Game/MIDI port, Line in/out Mic in.
- Power connector is ATX type
- Dimensions: 244 x 170mm MicroATX type

order code	price each
SB01382	£77.50

Contents Drivers for motherboard Win95/98/NT4.0, booklet for motherboard, 1 x floppy drive cable & 1x hard drive cable, Serial backplate.

CREATIVE Soundblaster 16 PCI Soundcard

- PCI stereo sound card • Creative WaveStudio 4
- 2, 4 and 8MB GM banks
- Up to 128 voice wave table synthesis
- Stereo wave recording • MPU 401 MIDI I/O port
- Direct Sound 6 • Tone control, bass and treble
- Sound effects, reverb and chorus
- DirectSound software acceleration
- DirectSound 3D software acceleration



order code	price each
CH72217	£27.51

PINE S3 Riva TNT2 4x AGP Graphics Card

- Single pass multi-texturing
- 32-bit colour pipeline • 32-bit Z/stencil buffer
- 300MHz DAC
- NVIDIA vanta chipset • 16MB or 32MB
- Min. Sys. Req.: Pentium, 32MB RAM, 20MB HDD, Free AGP Slot, DirectX 6, Windows 95/98
- Outputs: VGA connector
- Contents: Graphics Accelerator, CD Driver Disk, User Manual

NEW

order code	description	price each 1-4	5+
CH74277	16MB	£51.65	£47.96
CH74278	32MB	£67.74	£62.90

PINE S3 Virge DX 3D PCI Graphics Card

A high performance 3D graphics adaptor.
- 170MHz integrated RAMDAC
- Unique S3 Streams Processor for video playback
- S3 ViRGE chipset • 4MB EDO RAM
- Supplied with instructions and 3.5" driver disks

Technical Data

Chipset	S3 ViRGE/DX 86C375
Video Graphic Acceleration	High-performance 64-bit 2D/3D graphics engine with an integrated 170MHz RAMDAC and clock synthesiser. S3 for accelerated video playback
S3d Hardware Acceleration	Shading/3D texture mapping/Perspective correction/Alpha blending/Z-buffering/Depth cueing and fogging
Video Playback	Support for Indeo, Cinepak and software and hardware-accelerated MPEG-1 video
Bus Type	PCI Rev 2.1
Compatibilities	Register compatible with EGA & VGA. Supports VESA DDC2B standard
Resolution & Refresh Rate	1280 x 1024 x 256 colour @ 75Hz, 1024 x 768 x 64K colour @ 75Hz, 800 x 600 x 16.7M colour @ 75Hz
Software Driver Support	Win 3.1/95/NT
DRAM Interface	64-bit

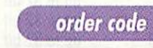
order code	1-3 price each	4+
CH39771	£38.08	£35.35

ATX Motherboard - Slot 1

Model: Spacewalker AB61

Features:
- Supports:
  Intel Celeron 266 - 466MHz
  Intel Pentium II 233/66 - 333/66
  Intel Pentium II 350/100 - 500/100MHz
  Intel Pentium III 450 - 500+ MHz
- Uses the Intel 82443BX AGP chipset
- 3 x DIMM slots available supporting up to 768MB of PC100 SDRAM
- Award Bios
- 1 x AGP, 5 x PCI, 2 x ISA slots
- 2 x 9 way Serial ports, 1 x Parallel port, 2 x USB ports, 1 x PS2 Mouse, 1 x PS2 Keyboard port, all onboard
- FDD and 2 x HDD (UDMA33) interfaces
- Four power modes are available, Full on /Doze /Standby /Suspend
- ATX power connector
- Dimensions: 305 x 170mm

Contents: Drivers for motherboard, booklet for motherboard, 1 x floppy drive cable & 1 x hard drive cable



SB01456

price each

£78.50

PINE Laguna II AGP Graphics Card

A state of the art 3D AGP graphics adaptor utilising the Cirrus Logic 5465 chipset.
- AGP provides 4 times the bandwidth of a 33MHz PCI bus
- 600MB/s RAMBUS based 2D/3D graphic accelerators
- 4MB RAMBUS Dram on board
- 16MB or greater scaleable memory by system RAM sharing technology
- Supplied with CD containing drivers/utilities and instructions

Technical Data

Chipset	Cirrus Logic 5465
Video Graphic Acceleration	64-bit 2D/3D graphics engine with an integrated 230MHz RAMDAC
3D Hardware Acceleration	Flat and Gouraud shading / 3D texture mapping / Alpha blending / Fogging / Z-buffering / Bi-linear filtering. Supports AGP 66MHz
Video Playback	Horizontal and vertical interpolation. Hardware occlusion for three video windows
Resolution & Refresh Rate	1600 x 1200 x 256 colour @ 85Hz 1280 x 1024 x 64K colour @ 85Hz 1024 x 768 x 16.7M colour @ 85Hz
V-Port for peripheral expansion	Connector supporting MPEG-2 decoder, TV-Tuner, video conferencing
Software Driver Support	Win 3.1/95/NT
Memory Capabilities	4MB RAMBUS Dram on board. Upgradeable to half system memory by AGP technology
Bus Type	AGP 1.0
Compatibilities	Register compatible with EGA & VGA. Supports VESA DDC2B Standard AGP 1.0

order code

CH39770





CHAINTECH BX ATX Motherboard

A Pentium II motherboard with a BX chipset and ATX form.
- Supports up to 450MHz Pentium II processors. Supports 66/100MHz system clock speeds (overclocking is possible)
- Chipset - Intel 82440BX two chip PCI set
- Memory - four 3.3V 168-pin DIMM sockets, up to 512MB. Supports 16/32/64/128MB, 64/72 bit unbuffered synchronous DIMM modules. Provides single bit ECC capability
- 1 x 32-bit AGP slots, 3 x 32-bit PCI slots, 3 x 16-bit ISA slots
- Award system BIOS supports PnP, APM, DMI and multi-device booting, includes Trend ChipAway virus protection
- Two ultra DMA-33 PCI IDE ports
- On board Ultra I/O. 1 x P (SPP/ECP/EPP) and 2 x S (16550A compliant) ports. 1 x FDD connector. IrDA IR function, two channel USB ports
- Dimensions: ATX form factor 305x220mm
- Advanced management features: software power-off control, power-on by modem etc. Poly-fuse over current protection for USB and keyboard, meets EPA green standard, supports FAN-II, ACPI features ready
- ATX Back Plane: 2 x USB, 1 x PS/2 keyboard, 1 x PS/2 mouse, 1 x parallel port, 2 x com ports
- Supplied with FDD and HDD leads, utility software (CD-ROM) and full manual

order code

CH44813



PINE S3 Savage 4 AGP Graphics Card

- 64 bit AGP 2X engine • 16 or 32 MB SDRAM
- Single pass multi-texturing • 32-bit colour rendering
- 2D/3D resolution 1920x1080
- MPEG 2 motion compensation for DVD playback
- Min. Sys. Req.: P11, 32MB RAM, 20MB HDD, Free AGP Slot, DirectX 6, Windows 95/98
- Outputs: VGA connector
- Contents: Graphics Accelerator, CD Driver Disk, User Manual

NEW

order code	description	price each 1-4	5+
CH74275	16MB	£36.51	£33.90
CH74276	32MB	£56.48	£52.44

SiS 2D/3D AGP Accelerator Card

An accelerator card which uses the 'SiS 6326AGP' chipset and 8Mb of memory. High performance 2D graphic and Video accelerator. High performance 3D setup Engine supporting 3DPRO with a fill rate of 40M pixel/sec.

Minimum requirements
AGP bus 1.0 compliant system, with Pentium processor. Windows 3.1, OS2, Windows 95.
Windows 98 or NT 3.5/4.0/5.0.

Technical Data

Resolution	Colour Depth	Refresh Rates
640 x 480	up to 32 bit	up to 85Hz NI
800 x 600	up to 32 bit	up to 85Hz NI
1024 x 768	up to 32 bit	up to 85Hz NI
1280 x 1024	up to 64K colours	up to 85Hz NI
1600 x 1200	up to 256 colours	65Hz NI

Game API Support Direct 3D, Open GL

order code **SB00810**

price each **£23.50**

SiS 2D/3D AGP Accelerator Card + TV Output

An AGP accelerator card which uses the 'SiS 6326DVD' chipset and 8Mb (not expandable) of SDRAM memory. The built-in TV output can use either RCA (composite video) or S-VHS connectors. Built-in motion compensation support for DVD.

Minimum requirements
AGP bus 1.0 compliant system, with Pentium processor. Windows 3.1, OS2, Win 95, Win 98 or NT 3.5/4.0

Contents VGA Card drivers on CD ROM and RCA-RCA lead.

Technical Data

Resolution	Colour Depth	Resolution	Colour Depth
640 x 480	up to 32 bit	1024 x 768	up to 64K colours
800 x 600	up to 32 bit	1280 x 1024	up to 64K colours
		1600 x 1200	up to 256 colours

order code **SB00811**

price each **£29.99**

InnoVISION S3 Savage 4 Pro Accelerator Cards

These AGP accelerator cards use the 'Savage 4 Pro' chipset from S3 to provide up to the minute 128-bit single cycle architecture, 2D/3D graphics processing power. Motherboards with a 4x AGP slot can now be run to their true potential. Hardware accelerated MPEG-2 and high quality, motion compensated DVD playback are also supported.

Features:
- S3TC texture compression • 32 bit true colour rendering
- 140M pixel/sec trilinear fill rate
- Specular lighting and diffuse shading effects
- Capable of 8M triangles /sec
- Contrast, hue, saturation, brightness and gamma controls

Minimum requirements:
AGP bus 4x/2x compliant motherboard, with Pentium processor.

FROM ONLY £33.25

Technical Data

Resolution	Colours
640 x 480	16 million
800 x 600	16 million
1024 x 768	16 million
1280 x 1024	16 million
1600 x 1200	16 million
1920 x 1200	256,000

Available in 3 versions:

order code	description	price each
SB01450	32MB	£51.85
SB01451	16MB	£38.55
SB01452	8MB	£33.25

Mighty Banshee 2D/3D AGP Accelerator Card

An accelerator card which uses the 'Banshee Voodoo 2' chipset (3dfx) and 16Mb of memory to provide outstanding results whether playing games or other graphic intensive software.

2D Features 100MHz 128-bit GUI accelerator. Hardware polygon generation and line drawing engine.

3D Features 100M pixel fill rate, 100M texels fill rate. Capable of 4M triangles /sec. On-Chip texture cache unit.

Minimum requirements
AGP bus 1.0 compliant system, with Pentium processor. Windows 95 OSR2.1 with USB supplement installed. Windows 98 or NT 4.0 with Service pack 3.

Technical Data

Resolution	Colour Depth	Refresh Rates
640 x 480	up to 32 bit	60,75,85,100,120
800 x 600	up to 32 bit	60,75,85,100,120
1024 x 768	up to 32 bit	60,70,75,85,100,120
1280 x 1024	up to 32 bit	60,75,85,100,120
1600 x 1200	up to 32 bit	60,65,70,75,85,100
1900 x 1440	up to 32 bit	60

Game API Support Direct 3D, Open GL, Glide

order code **SB00808**

price each **£49.99**

3DFx Voodoo 3 AGP Video

Model: 3DFx Voodoo 3 2000 and 3000

Features
- Uses the 'Voodoo 3' 128bit chipset
- 16MB 166MHz SDRAM onboard memory
- RAMDAC of 300MHz for 2000, RAMDAC of 350MHz for 3000
- Connectors on rear: 2000 - SVGA out, 3000 - SVGA out and Video out
- Digital Video Input connector on pcb
- Requires AGP slot
- Drivers for Win 95/98/NT 4.0

Contents Voodoo Card, Driver on CD-ROM, Manual

FROM ONLY £70.99

Technical Data

Resolution	Colour Depth
640 x 480	up to 16.7M colours @ 160Hz
800 x 600	up to 16.7M colours @ 160Hz
1024 x 768	up to 16.7M colours @ 120Hz
1280 x 1024	up to 16.7M colours @ 100Hz
1152 x 864	up to 16.7M colours @ 120Hz

order code	description	price each 1-2	price each 3+
SB01376	Voodoo 3 2000	£77.99	£70.99
SB01377	Voodoo 3 3000	£112.99	£102.99

PHILIPS 32x IDE CD ROM

- 32x multiread CD-ROM drive
- ATAPI/IDE interface
- Up to 4.8MB/s data transfer rate
- Ultra DMA
- Seek time less than 75ms at 1/3 stroke
- Compatible with all CD formats
- Plug and Play
- MultiRead function to read CD-RW media
- Digital servo technology
- 128KB built-in buffer size
- Audio CD Play/Skip control button

While Stocks Last





order code **CH39798**

40x EIDE CD-ROM

FROM ONLY £22.99

Model: Boss V
- ATAPI / EIDE interface
- 40x Multiread CD ROM drive supports CD-R & CD-RW
- UDMA • 128KB buffer
- Analogue and Digital audio output on rear panel
- Headphone socket and volume control on front panel
- Win 3.1, 95, 98, NT & OS2 compatible
- Retail Packed

Contents: CD drive, driver disk, audio cable and mounting screws.

order code	price each 1-9	10-19	20+
SB01395	£26.99	£25.99	£22.99



50X IDE CD-ROM Drive

NEW

Features
- Data transfer rate (max.): 7500kB/s • 128kB data buffer
- Front Panel: Play/Next, Stop/Eject buttons on front panel
- Energy saving spin down mode • Access time: <105ms
- Supports Audio CD, CD-ROM/XA, CD-R, CD-RW, Photo CD, Video CD
- Min. Sys. Req.:386, Windows 3.1/95/98/NT
- Contents: CD-ROM Drive, Driver Diskette, Screws, Sound Card Lead

order code	price each 1-4	5+
CH73232	£39.80	£36.95

External PCMCIA 2.5" IDE Box

While Stocks Last

Features
- Allows the user to add an external HDD (2.5") via a PCMCIA slot.
- PnP compliant PCMCIA type II (Release 2.1) interface required.
- Supports PCMCIA hot-swapping feature. • No external power required.
- Transfer rate up to 2MB/sec - depending on drive type.
- Supports DOS (V5 or above) / Win 3.1/95/98/NT.
- Dimensions: 85 x 140 x 30 (WxDxH).

Contents Adaptor box, PCMCIA adaptor cable, driver disk & User instructions.

order code	price each 1-4	5+
SB00708	£38.99	£36.99

PCMCIA CD ROM Drives

Model True Mobile PSCD-740

Features
- Compatible with PCMCIA 2.1 type II or III slots
- Uses Teac drive mechanism • Weight: 450g
- Headphone socket and volume control
- Play, Stop, Pause and skip buttons
- Compatible with DOS, Win 3.1/ 95/ 98 /NT4.0 & OS2/Warp
- 512Kb buffer
- Powered from PCMCIA slot or external 5V DC adaptor (not supplied)
- Retail boxed • Dimensions: 145 x 150 x 21mm (LxWxH)

Contents CD ROM, PCMCIA lead, Audio lead 3.5/3.5mm, Manual and Driver disc

Optional Extras	order code	price each 1-2	3+
20 speed CD ROM	SB01370	£82.50	£71.99
24 speed CD ROM	SB01241	£89.25	
AC Adaptor	PW00177	£7.91	

Headphones - see CPC's Catalogue for full range

IOMEGA Zip ATAPI Internal Disk Drive

An internal version of the ZIP drive. Each Zip disk can store 100MB of information, making it a powerful storage medium. The Zip ATAPI connects to the internal hard drive controller using a standard IDE/ATAPI interface and internal power supply (5.25" type). The drive's form factor allows it to fit in a spare 3.5" bay. The drive is supplied with drivers for Win 3.1/95/NT and Iomega Tools software on CD-ROM.



Technical Data

Average Seek Time	29ms
Sustained Transfer Rate	Up to 1.4MB/sec
Typical Throughput	Up to 84MB/min
Dimensions (L x W x H)	163 x 101 x 25mm

price each 1-3	4+	order code
£65.66	£60.99	CH39795

ACER 50X EIDE CD-ROM Drive

50 SPEED



Model: 650P-072
- 7500kB/s max data transfer rate • EIDE/ATAPI interface
- Flash memory for firmware updating • Horizontal or vertical mounting
- Compatible with all existing CD formats
- Internal suspension system for consistent high speed reading
- Digital servo control • High audio extraction speed
- Front panel: disk ready/data seek LED, digital volume control, stop/eject button, audio play/skip button, 3.5mm stereo phone jack
- Supports ultra DMA with 33.3mB/s burst data transfer rate
- Supports MD-DOS/ Windows 3.1x, 95/98, NT, OS2 warp
- Contents: user guide, CD-ROM drive, driver disks, soundcard lead, screws

order code	price each 1-4	5+
CH66338	£44.62	£41.43

External PCMCIA Hard Drives

External drives with PCMCIA interfaces, ideal for use with notebook or laptop computers.
- Can be powered from the PCMCIA port, if suitable, or via an external DC adaptor (not supplied)
- Uses either a type II or III PCMCIA port
- Dim: 85 x 140 x 30mm (WxDxH)
- Compatible with Windows 3.1/95/98/NT, using PCMCIA Release 2.1, Compliant Card/Socket service

Contents: PCMCIA cable, External drive and carry case

order code	description	price each 1-2	3+
SB01371	1.0 GB drive	£92.99	£82.50
SB01372	1.6 GB drive	£102.99	£92.99

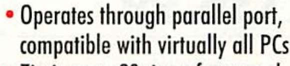
Iomega ZIP Drive

An inexpensive, reliable and easy-to-use method of getting organised. Each Zip disk can store 100Mb of information, this, combined with a fast access speed (29ms), make Zip a powerful storage solution.

- Operates through parallel port, compatible with virtually all PCs
- Zip is up to 20 times faster and 70 times bigger than a normal floppy
- Zip drive is portable, so files can be moved from home to work and back again
- Zip Plus also available. Combined SCSI and parallel interface unit.
- 100 MB allows organisation and storage of all files

Average Seek Time	29ms
Typical Throughput	20MB/minute
Transfer Rate	0.79MB/s min, 1.4MB/s max.
Dimensions (HxWxD)	38 x 137 x 18 mm

order code	type	price each 1-4	5+
CH09832	Zip (Parallel port version)	£101.95	£97.37
CH09833	Zip Disks (pack of 6)	£42.42	£40.68
CH44804	Zip Disks (pack of 1)	£7.75	£7.42



Wearnes CD-RW Recorder

While Stocks Last

Model Wearnes CDRW622

Features
- ATAPI EIDE 6xRead. 2xCD-R, 2xCD-RW drive
- It is mountable in a standard 5.25" bay • Buffer of 1MB
- Capacity: Mode 1 - 533MB, Mode 2 - 635MB
- Transfer Rate - 2xSpeed (Read & Write) 300KB/s (mode 1), 352.8 KB/s (mode 2) 6xSpeed (Read only), 900KB/s (mode 1) 1145KB/s (mode 2)
- Software supplied is Adaptec's 'Easy CD Creator' & 'Direct CD'
- Formats supported, (Read and Write) CD-DA Redbook Audio, CD-ROM (mode 1&2), CD-ROM XA, (Photo CD, Video CD, CD-G), CD-1 Multi session bridge disks, Mixed mode CD, UDF, CD-Plus, Photo CD (single & multi session). (Write only). Enhanced CD

System Requirements Pentium Processor, Win 95, 8MB RAM, Soundcard (for Audio recordings).

Contents CD-RW recorder, Quick start manuals, Audio cable, Mounting screws and blank disk.

order code **SB00692**

ONLY **£110.00**

PHILIPS 4x4x32 EIDE CD-ReWritable Drive

Model PCRW 404K
- 4x Write, 4x Rewrite, 32x Read
- Write speed 1x: 150kB/s, 2x: 300kB/s, 4x: 600kB/s
- Rewrite speed 4x: 600kB/s • Read speed 32x: 4.8MB/s
- Access time:115ms • Data buffer:2MB
- Exclusive metallic design
- Supplied with Write2CD recording software with CeQuadrat packet writing (English, French, German, Spanish, Italian)
- Supports all major CD formats (Not DVD)
- Horizontal or vertical mounting
- **Contents** CD RW Drive, User manual, Driver disk, Sound card lead, IDE lead, 1x Blank Philips CD-R74 and CD-RW74 disc, Screws
- **System requirements** Win 95/98/NT, P75, 16MB RAM, 12MB HDD

order code	price each 1-4	5+
CH66340	£203.85	£189.29

Delta CD-RW Recorder

Model Delta OME-W141



- ATAPI EIDE 20 x Read, 4 x Write, 4 x ReWrite recorder
- Uses a Ricoh CD mechanism
- Mountable in a standard 5.25" bay, Vertical/Horizontal
- Utilises Track at Once, Disk at once, Packet Write & Multisession writing modes
- Formats supported: CD-DA, CD-ROM, CD-Extra, CD-ROM XA, Photo CD, CD-I, Video CD and CD-ROM+CD-DA
- Capacity is 650Mb using a 74 minute disk
- Headphone connector on front panel and Analogue audio out on rear panel
- Software supplied : PhotoGenie, Direct CD, Easy CD Creator and DIY-RW
- Supplied in full retail packaging • 2Mb buffer

System Requirements: Pentium 100MHz(min), 32Mb RAM, Win 95/98, Win NT4.0 (pack 3)

Contents CD-RW recorder, Manuals, Software, Mounting screws and Audio lead

order code	price each
SB01236	£136.99

MEMOREX Combination CD-RW/DVD-ROM Drive

Model: TriMaxx 200
- 6x Write, 4x Rewrite, 24x Read
- 4x DVD-ROM
- EIDE/ATAPI interface
- Internal buffer size: 2MB
- Front Panel: Load/Eject Disc, Busy Indicator, Volume Control, Headphone Jack
- Access Time: CD<120ms, DVD<200ms
- Format Supported: CD-DA/ROM/ROM XA/I, DVD-ROM/Video
- Contents: Drive, Blank Memorex CD-RW, Manual, Driver Diskette, Adaptec CD Mastering Software (Includes Easy CD Creator V3.5c, DirectCD V2.5d, MGI PhotoSuite), MGI Photosuite, Audio Cable, Mounting Screws
- Min. Sys. Req.: P166, 32MB RAM, Windows 95/NT 4 (V3)

Please Note: This unit is not a DVD recorder.

order code	price each 1-4	5+
CH72105	£324.62	£301.43

IDE External Case

A professional, quality external case designed to house 5.25" IDE devices such as CD ROM or CD R units (parallel to IDE connection). The case has an internal metal shelf for mounting devices with a tough, plastic outer cover.

Features
- Fitted with parallel port (EPP/ECP) to IDE converter unit
- External connections IEC socket (mains), illuminated on/off switch, 2 x phono audio out, DB25 female (parallel port), DB25 male (to printer)
- 17W internal psu
- Internal connections, device power (PC 4-way standard), 40-way IDE plug and CD ROM audio
- Supplied with driver disk, instructions, parallel port to case lead and screws
- Dimensions (LxWxH) 200 x 170 x 58mm
  Requires IEC power cord CPC order code PL00382

order code	price each 1-4	5+
CH09752	£46.50	£42.25

i-Stor CD-RW Recorder

Model Wearnes i-Stor CDRW1688

Features
- ATAPI EIDE 16 x Read, 4 x Write, 4 x ReWrite recorder
- Utilises Track at Once, Disk at once, Packet Write & Multisession writing modes
- Formats supported: CD-DA, CD-ROM, CD-Extra, CD-ROM XA, CD-I and Video CD
- Headphone connector on front panel and Analogue audio out on rear panel
- Capacity is 650Mb using a 74 minute disk
- Software supplied : NTI CD-maker
- 2Mb buffer • Supplied in full retail packaging

System Requirements
Pentium 100MHz(min), Win 95/98, Win NT4.0 (pack 3)

Contents CD-RW recorder, manual, CD-RW blank disk and software



order code	price each
SB01378	£164.99

3½" Hard Disk Drives

While Stocks Last

3½" Drives IDE

order code	description	price each
SB00651	4.3Gb (Samsung) Model: VG34323A Spindle speed: 5400rpm Cache: 512kb Av. Seek Time: 10msec	£45.99
SB00736	4.3Gb (Seagate) Ultra ATA Model: ST34310A Spindle speed: 5400rpm Cache: 256kb Av. Seek Time: 9msec	£49.99
SB01366	8.4Gb (Seagate) Ultra ATA Model: ST38421A Spindle speed: 5400rpm Cache: 256kb Av. Seek Time: 10.5msec	£91.99
SB00819	8.4Gb (Samsung) Model: SV0844A Spindle speed: 5400rpm Cache: 512kb Av. Seek Time: 10msec	£92.99
SB00739	10Gb (Seagate) Ultra ATA Model: ST310230A Spindle speed: 5400rpm Cache: 256kb Av. Seek Time: 9.5msec	£99.99
SB01431	20Gb (Seagate) Model: Barracuda ST320430A Spindle speed: 7200rpm Cache: 512kb Av. Seek Time: 8.6msec	£142.99
SB01430	28Gb (Seagate) Model: Barracuda ST328040A Spindle speed: 7200rpm Cache: 512kb Av. Seek Time: 8.6msec	£189.99

12.9Gb Hard Disk

Samsung 12.9Gb IDE UDMA hard disk - type SV1296A



order code	price each
SB01381	£108.99

IBM 20.3Gb Hard Disk Drive

Model: DJNA352030 IBM Deskstar 25GP

- UDMA 33/66
- 9msec Access Time
- 2Mb Cache
- 5,400 RPM

FROM ONLY £109.99

order code	price each 1-2	price each 3+
SB01457	£119.99	£109.99

20.4Gb 3.5" Samsung Hard Disk Drive

ONLY £99.99

Spinpoint Series Model: SV2044D

3.5" High Performance HDD, Microsoft Certified, with acoustic noise suppression technology.

- Fast ATA-5 Compatible
- Ultra DMA 66 Support
- S.M.A.R.T. Compliant
- Weight: 1-1 lbs
- Dims: 1"x 4"x 5.25" (HxWxD)
- Buffer Size: 512k
- Av. Seek Time: 8.5msec
- Spindle Speed: 5400rpm

order code: **SB01474**

HDD Cradle - 3.5" IDE

A 3.5" HDD cradle which fits in a standard 5.25" bay therefore allowing 3.5" drives to be swapped between PCs or different drives to be used in one PC. It has a handle for easy removal and a pack of fixing screws. The connector between cradle and holder is a 50 way Centronics. Unit measures (tray in cradle) (LxWxH) 225 x 146 x 43mm.

order code	price each 1-9	price each 10+
SB00684	£7.20	£6.70

HDD Connection Lead

Hard Drives - IDE Controller to Twin HDD 40-way IDC **Length** 20".

order code	price each 1-9	price each 10+
CH01729	£1.41	£1.13

3.5" 1.44MB Floppy Drive

Samsung standard 3.5" 1.44MB floppy disk drive. Industry standard 34-way IDC and 3.5" power connections.

order code	price each 1-9	price each 10+
CH39796	£11.35	£10.48

3.5" 1.44MB Floppy Drive

Description **Mitsumi (D359T5)**
Standard 34-Way and power connection

order code	price each 1-9	price each 10+
SB00233	£12.35	£11.60

256k Cache Module

order code	price each
SB00493	£21.99

SIMM Socket

While Stocks Last

ONLY 13p



72 Pin Simm Vertical mounting.

order code: **SB00397**

CPU Coolers

Heatsink and fan assemblies for the following

order code	description	price each 1-4	price each 5+
SB01164	Pentium II (fully encased type) to 350MHz	£4.40	£4.10
SB01166	Pentium II (semi encased type) SECC 2 up to 600MHz	£4.40	£4.10
SB01163	AMD K6/K6-2 166-350MHz & Intel MMX up to 233MHz	£2.35	£2.05
SB01165	AMD K6, K6-2, K6-3, 166-450MHz & Intel (socket 370) Celeron up to 466MHz	£3.10	£2.85
SB00627	Pentium II (fully encased type) to 350MHz (Model: HP21-1A)	£4.90	£4.10
CH35284	Heat sink and fan for Pentium (to 233MHz) and Cyrix P200 +, Dimensions: 31x50x53mm, Bearing Type: Ball	£3.10	£2.85
CH35285	Heat sink and fan for K6 (to 300MHz), Dimensions: 37x50x64mm, Bearing Type: Ball	£4.70	£4.30
CH35286	Heat sink and fan for Pentium II (233-266MHz) Dimensions: 55 x 120 x 19mm, Bearing Type: Ball	£10.88	£10.25

Brass tacks

A question that arises frequently when describing the multi-platform Linux operating system is "how come you can get Linux for all hardware?" compared to the fact that you only get MacOS on Macs, RISC OS on Acorn and Windows on PCs?

At first glance this looks like a matter of specific operating systems being tailored to specific processor chips. This is not entirely untrue, an operating system is a very complex piece of software and the heart of it, the kernel will most likely be written directly into the machine code of a specific processor.

The coding of the kernel is a big investment of resources for a commercial company. As an operating system grows in complexity it becomes harder to make the corporate decision to shift it to another processor family: is it really likely that the investment will be rewarded? So it doesn't happen much.

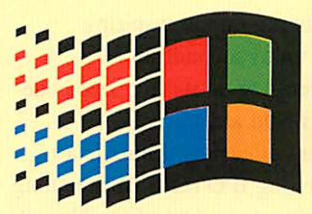
Hence RISC OS runs on ARM chips because that's what it started on, and Windows runs on the Intel x86 and Pentium processors. MacOS is an interesting case here, originating on the Motorola 680x0 series it was eventually moved to the PowerPC range of chips, but through clever emulation could still run old 680x0 software at an acceptable speed.

Commercial decisions being what they are one version of Windows has, in fact, been ported to other processor types: Windows CE (Consumer Electronics). This much-simplified version of Windows was designed for palmtops, unfortunately the Intel chips are so greedy for power they don't make good processors for the tiniest of portable computers, the low power-consumption ARM chips, however, make very good processors indeed.

So the Microsoft "suits" decided that porting Windows CE would be a worthwhile investment.Which it probably wasn't but that's another story.

Both Windows and MacOS were written in such a way that the other chips that surround the central processor are less important, it's a relatively easy job to modify small sections of the kernel to deal with slightly different hardware.

For RISC OS the problem is more serious, not only would the code need altering, but there are major sections which rely on the assumption that the ARM chip will be surrounded by a set of other, highly specific, custom chips handling the input/output and video. But given resources and time even this can be dealt with. The point being made



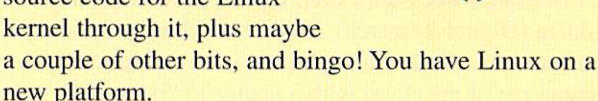
is that it is feasible for commercial operating systems to be moved from one architecture to another, but it can be expensive.

But there is a different design viewpoint to take: These standard desktop operating systems have evolved in time, following their respective hardware developments. But what if you started with the operating system design, and assumed that you had no idea what the target hardware was going to be?

That is pretty much the approach of the commercial Unix and its free copycats: Linux and BSD. There is little in the way of assumption about the target hardware (in the case of Unix it made no commercial sense to limit it back in the 60s) and those things that rely on the hardware are packaged up in the kernel so that they can be altered easily thus porting to a new processor becomes less of a chore.



Not only that, but the software is written in C, the (relatively) portable high level language, so that the conversion to a new processor is made even easier. All you need is a C compiler for the target hardware, run the source code for the Linux kernel through it, plus maybe a couple of other bits, and bingo! You have Linux on a new platform.



Easy? Well, not quite. It's *never* that easy.

The first hurdle is the fact that C is never implemented in exactly the same way, even though it's supposed to be a standard; so the dedicated individual doing the port has to hack around to get it to work, hopefully not introducing any errors.

Then there's the hardware differences. Operating systems are the layer of software that goes between the hardware itself and the application software and the user. It's what makes the hardware usable, no operating system means no useful computer.

But different hardware does different jobs in different ways. A fundamental operation of an operating system is reading a key pressed on the keyboard, how the hardware does this, what parts of the physical machine need interaction, these are hardware-specific and the kernel must know what to do.

So it's not a really easy thing to do, but it's easier than trying to port a hardware-specific operating system and that's why you can get Linux for anything.



Sober look at Linux

The development of Linux is based on the inspiring altruism of Richard Stallman, today a handful of daydreamers continue to concentrate on writing free code in a vain attempt to make the world a better place.

However, for many of their colleagues, Linux is all about gaining market share, setting IPO records, executing corporate takeovers, and boosting egos. Out of the blue, it also turned out that the operating system, which was brought into the spotlight by a relatively small group of part-time hobbyists, needs hundreds of millions of dollars to continue to evolve.

In a few short years, Linux has grown from a mere curiosity into a multi-billion business that is now poised to take over the entire industry. The early nineties idealism has largely cleared the way for a corporate greed-fest for the new millennium. Almost overnight, the cute little penguin has started to resemble a hungry wild predator, while also gaining the notorious status of a heavily guarded "holy cow." Anybody brave enough to say something remotely critical about Linux is risking being "flamed" to death.

Not only that, but the one attribute of the original Open Source movement that remains intact is its bitterly anti-Microsoft nature. The main difference is that it is no longer fueled by a desperate crusade of some disgruntled teenagers against the "Evil Empire." Instead, all the corporations that were once bruised by Bill Gates' furious marketing machine, are starting to see Linux as their newfound weapon.

Companies like Sun, Corel, Inprise (Borland), and Caldera (Digital Research), have been selling proprietary software since the beginning of time, are unexpectedly coming out of the closet with a pledge to "reinvent" themselves as energetic Open Source supporters.

The situation wouldn't be so alarming if not for three additional factors that must be taken into consideration. First of all, I have yet to see a solid proof that any business model based on trying to make money on something that is 100% free is sustainable in the long run. According to IDC, Linux already controls 25% of all server OS shipments yet accounts for far less than 1% of total revenue in the market.

Over time, more people will get broadband access and discover that Linux can be downloaded for free. That will make it increasingly more difficult to sell any boxed CD sets at all. Furthermore, if the Linux community can deliver on the ease-of-use promise, the market for related support and maintenance will continue to shrink as well.

Second, it is still premature to claim that publicly developed products will always have some inherent advantages over their commercial counterparts. In fact, so far Linux is one of only a small number of Open Source projects that have proven to be victorious, if only in the server arena. One notable fiasco that comes to mind is Mozilla.org, a volunteer-driven organization that has yet to come up with a single meaningful upgrade to the once-dominant browser.

Third, we must not lose sight of the fact that beyond the far-fetched philosophical implications of the Open Source arguments lies recycled UN*X technology, which is literally decades old. In reality, from an ordinary end user's perspective, there is hardly anything unique (or "innovative," if you allow me to use this tired word) about Linux's look-and-feel. For some unknown reason, all of the popular Linux GUIs are disturbingly similar in appearance to, of all things, Microsoft Windows. And, while Linux's interface is almost infinitely customizable, it lacks consistency that many of us have grown to appreciate. Moreover, as a matter of opinion, few of the usability improvements are revolutionary.

Isn't it ironic?

This whole story is jam-packed with paradoxes. A product that was developed in an attempt to fight market monopolization, is quickly elbowing its way to becoming the next monopoly (assuming that term can be applied to open source software). The Open Source movement, which was originally positioned as a non-profit alternative to the opulent establishment, is soaking in money.

And, the same people who, not so long ago, aspired to make Linux strive on its technological merits alone, are now often resorting to the same dreaded marketing tricks that turned them away from earlier commercial operating systems in the first place.

As they say, what goes around, comes around.

About the author

Stanislav Kelman is an active osOpinion.com contributor who is neither paid by nor affiliated with any of the evil Linux-hating forces. He is a big fan of BeOS, a Mac addict, an occasional Linux-Mandrake user, an OS/2 admirer, and a Windows detester.

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TeX-nique

In the first article of this series I introduced you to the TeX world and to some of the tasks which can be accomplished by an adventurous user. In this article I'll put flesh on the bones of our skeleton document "bones/tex" in order to show how LaTeX can be used to include a range of images in a document. Hopefully, this approach will be a worthwhile corrective to the notion that TeX is only suitable for maths typesetting.

Figure I shows a table and a bar chart – viewed through *SeeDVI* – which were included in a report which investigated bullying in a school. Moreover, Figures II and III show the code which was needed in order to produce the bar chart and the table.

I have limited my discussion to LaTeX environments and packages because I prefer to use packages which produce output which is stylistically in keeping with the rest of the document. Users who would however, prefer to include drawfiles within a LaTeX document would be well-advised to learn how to use the RISC OS specific special commands. The manual which comes with David Bryan's *SeeDVI* is a good source of information in this regard as is the documentation that comes with Paul Field's *DVIview*.

No doubt, the code fragments look a little incomprehensible but all will become clear after we have explored a number of key LaTeX concepts.

LaTeX concepts

I've found that the easiest way to understand LaTeX mark-up is to think in terms of the structural features of a document. The largest unit is the document itself whose appearance is dependent on the "document class" that the user selects. The document may then be divided into sections, sub-sections, paragraphs, sentences and words. Obviously, the way in which the document is partitioned depends upon the document class that is selected. A book has a more complicated structure for example than a slide.

LaTeX would be extremely difficult to get to grips with if you had to design a style sheet for each document that had to be typeset. With the needs of ordinary users in mind, Lamport consequently devised a number of default classes: slide, letter, article, report and book. Each class contains default settings for page size, font style, font size, title and section styles. The provision of default classes is very useful because it allows the user to attend to content rather than structure.

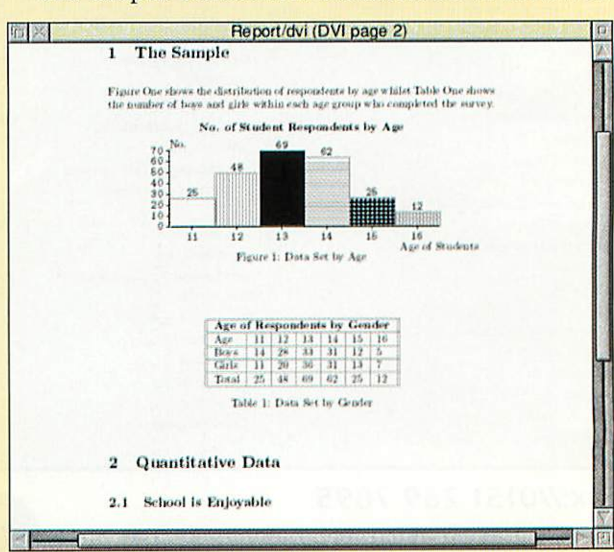
In the "article" class that we use for our example, the default font size is 10pt. A particular class may be selected by including one of the predefined class names as the argument of the document class command. A number of optional parameters are also available if you require a different font size or more than one column.

A document includes sentences which are grouped into paragraphs which are in turn included within sections. Our sample document is made up of five sections: The Sample, Quantitative Data, Summary of Quantitative Data, Qualitative Data and Conclusion. Figure IV shows the sectioning commands after the sample document was run through a *sed* script which displays a outline. Such a procedure can be useful in order to see LaTeX's hierarchical organisation of documents in action.

Figure II shows that a section can be specified by including the section's title as the argument of the \se command. In the normal course of events, the user would begin a section with the \section command but I have redefined the \section command so that \se has the same effect. Take a look at the first occurrence of the \newcommand in Figure II to get an idea of how to redefine your own commands. Note that LaTeX also automatically generates section numbers.

There are additional sectioning commands – \subsection, \subsubsection and so forth – which are used in a similar way to the \section command although the availability of a complete set of commands is dependent upon the document class that has been selected.

The \chapter command is not accessible to users who


Report/dvi (DVI page 2)

1 The Sample

Figure One shows the distribution of respondents by age whilst Table One shows the number of boys and girls within each age group who completed the survey.

Figure 1: Data Set by Age

Age of Respondents by Gender						
Age	11	12	13	14	15	16
Boys	14	28	33	31	12	5
Girls	11	20	36	31	13	7
Total	25	48	69	62	25	12

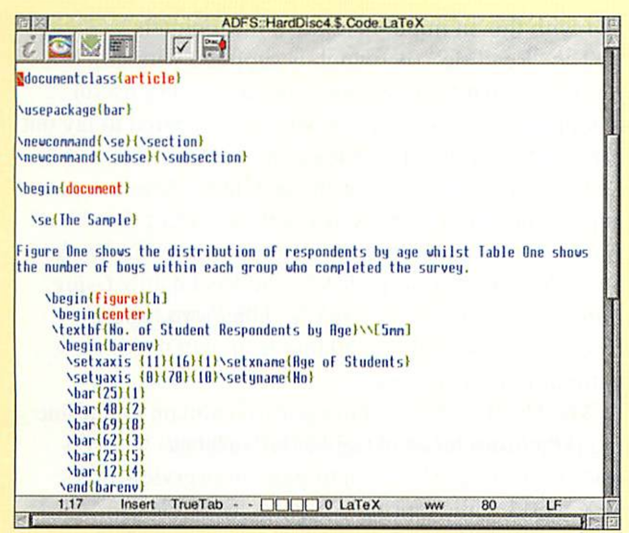
Table 1: Data Set by Gender

2 Quantitative Data

2.1 School is Enjoyable

Figure I: Place a graph or a table in your LaTeX document





```
\documentclass{article}

\usepackage{bar}

\newcommand{\se}{\section}
\newcommand{\subse}{\subsection}

\begin{document}

  \se{The Sample}

Figure One shows the distribution of respondents by age whilst Table One shows
the number of boys within each group who completed the survey.

    \begin{figure}[h]
     \begin{center}
     \textbf{No. of Student Respondents by Age}\\[5mm]
      \begin{barenv}
       \setxaxis {11}{16}{1}\setxname{Age of Students}
       \setyaxis {0}{70}{10}\setyname{No}
       \bar{25}{1}
       \bar{48}{2}
       \bar{69}{8}
       \bar{62}{3}
       \bar{25}{5}
       \bar{12}{4}
      \end{barenv}
```


Figure II: LaTeX code for the bar chart

have selected the "article" document class for example. The end of a paragraph is denoted by one or more blank lines. The text within each paragraph is produced by simply typing as you would into any word processor with the exception that the TeX processor treats one inter-word space as it would twenty inter-word spaces. Both have the effect of producing one space.

LaTeX commands

LaTeX commands begin with a backslash and continue with a combination of alphabetic letters. The scope of the command – that area of the document that the command has an effect upon – begins and ends with a brace pair. Thus the scope of the command \textbf{No. of Student Respondents by Age} is limited to the text in between the braces.

Text-enhancing commands like \textbf have a corresponding LaTeX declaration. \textbf may for example be substituted for the \bfseries declaration. The distinction between commands and declarations is a useful one because it reminds you that commands which alter the visual appearance of a document belong to the category of command which describes the document's logical structure.

As well as taking care of the structural characteristics of a document, LaTeX also allows the user to incorporate text, equations and graphics into any document. The base LaTeX system includes many environments for displaying quotations, lists and mathematics. Figure V shows a typical list from the sample report which was generated with the "itemise" environment. In addition to the itemise environment – which precedes each item by a small black circle – the user can also avail of the "enumerate" and "description" list environments.

But what should the user do if he wishes to accomplish a task which is not possible with the base system? One possible answer is to use a package which extends LaTeX. I wanted for example to produce a bar chart to summarize my data set. I therefore selected the bar package and invoked it with the \usepackage{bar} command which had to be placed in the preamble – that area of your code between the \documentclass and \begin{document} commands.

As a result of invoking the package, I now had access to the "barenv" environment. That section of the code which is applicable to the bar package begins and ends with the \begin{barenv}...\end{barenv} pair.

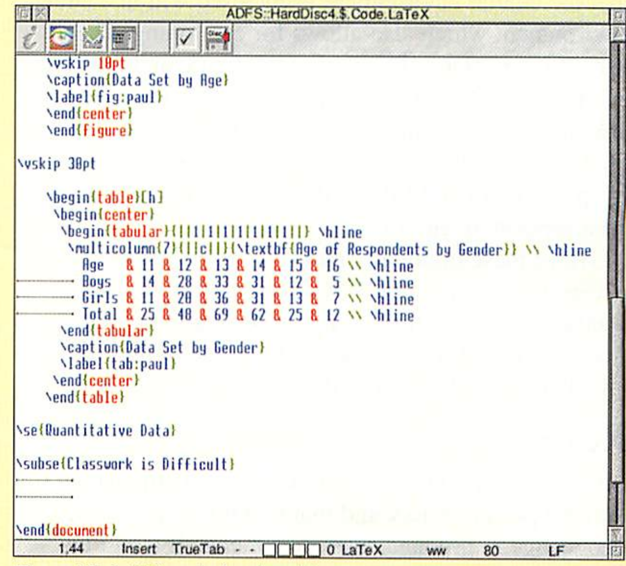
The Bar Package

The bar package can be used to generate 2D and 3D bar graphs. Use of this package enables the user to define the beginning and end points of the x and y axes as well as the value of the step. The command \setxaxis {11}{16}{1} produces an x axis whose start and end values are 11 and 16 respectively while the final parameter {1} sets the step value to one. As well as having the ability to customize the axes, it is also possible to set the height of the bar, select a hatch index and include an optional description of the bar. Thus \bar{25}{1} creates a bar with a height of 25, a hatch index of 1 (white) and no description.

Obviously, we have only touched on what is possible with the bar package but you should be able to produce a simple bar graph like the one in Figure I after inspection of Figure II's sample code and a little experimentation. If you have need of an in-depth understanding of this package, then refer to Goossen et al's *The LaTeX Companion* or to the documentation by Joachim Blesser and Edmund Lang which comes bundled with the bar package.

Tables

You don't have to use a LaTeX package in order to generate a table, it can be done with the "tabbing" or "tabular" environments but the code snippet from Figure III makes use of the tabular environment. The tabular environment's argument is made up of a combination of vertical lines and letters. The '|' symbol places a vertical line at the place that the user specifies while the letters denote left, right or centred



```
    \vskip 10pt
    \caption{Data Set by Age}
    \label{fig:paul}
    \end{center}
    \end{figure}

\vskip 30pt

    \begin{table}[h]
     \begin{center}
      \begin{tabular}{|l|l|l|l|l|l|l|} \hline
       \multicolumn{7}{|c|}{\textbf{Age of Respondents by Gender}} \\ \hline
        Age   & 11 & 12 & 13 & 14 & 15 & 16 \\ \hline
        Boys  & 14 & 28 & 33 & 31 & 12 &  5 \\ \hline
        Girls & 11 & 20 & 36 & 31 & 13 &  7 \\ \hline
        Total & 25 & 48 & 69 & 62 & 25 & 12 \\ \hline
      \end{tabular}
      \caption{Data Set by Gender}
      \label{tab:paul}
     \end{center}
    \end{table}

\se{Quantitative Data}

\subse{Classwork is Difficult}


\end{document}
```


Figure III: LaTeX code for the table

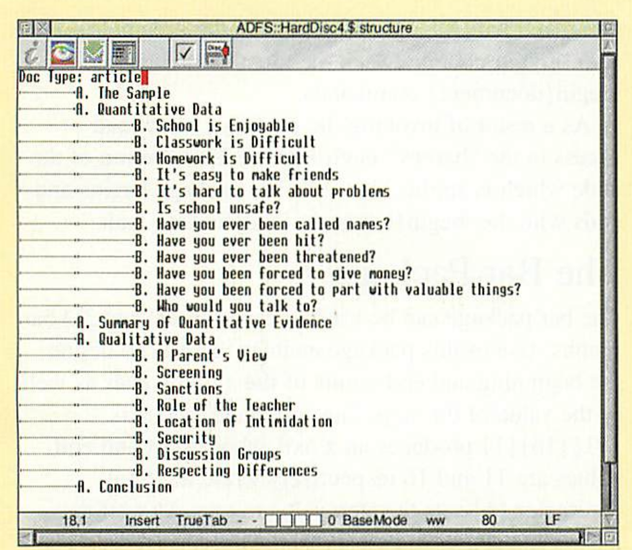


Figure IV: The structure of a LaTeX document

justification of columns.

So, our Figure III code snippet produces a table with seven columns. Horizontal lines which span the width of the environment are in turn produced with the \hline command while the \multicolumn command can be used to place an item across more than one column. Thus the \multicolumn command from Figure III has the effect of spanning the title 'Age of Respondents by Gender' across seven columns.

Floating objects

Although text can be split across pages in order to fill a previously empty page, this is not desirable with objects like tables and graphs. The LaTeX solution to this problem is to "float" such material to a specific position on the page. Our sample code accomplishes this by making use of the "figure" and "table" environments. Inspection of Figure II shows that the barenv is enclosed within a figure environment. The figure environment is especially valuable because it allows the user to caption the floated object.

In a similar vein, the Figure III code fragment shows that the tabular environment is enclosed within a table environment which also allows for captioning. The perceptive reader will note that the figure and the table environments both take optional [h] arguments. The [h] argument instructs the program to place the table or graphic where this is written. Other options include [t]op, [b]ottom and [p]age, this last one places a float on a separate page of floats.

All of these optional arguments are necessary because floats are not always placed where the user wants them. In a situation where there are too many floats, there will be a tendency for some of them to "float" towards the end of the document!

Resources

I hope that this short series has given you an insight into the power of TeX and that you now have enough knowledge to produce basic documents. It won't be long however, before you require additional information and with this in mind, here are a few pointers.

The "ReadMe" file which is supplied with armTeX release 3 (texmf:armtex.doc) contains a very useful reading list for those of you who are prepared to lay out hard cash. If you want to learn about Plain TeX or LaTeX without paying for the privilege, there are a number of free resources available including Doob's *A Gentle Introduction to TeX*, Oetiker et al's *The Not So Short Introduction to LaTeX2e* and Reckdahl's *Using Imported Graphics in LaTeX2e* (**http://www.tug.org/**). Doob's e-book is also available from APDL for those without Internet access.

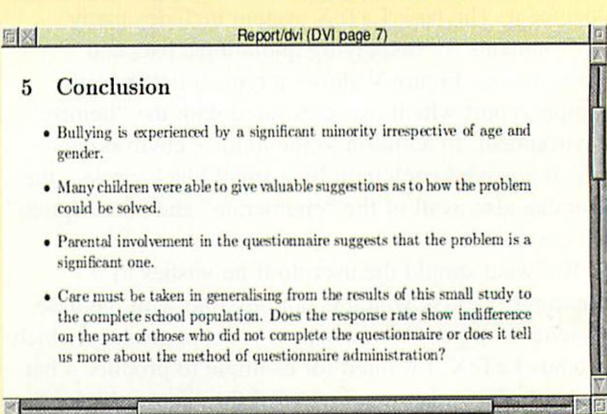
The UK TeX Users' Group also maintain an on-line faq (**http://www.tex.ac.uk/cgi-bin/texfaq2html/**) which is useful for those who wish to gain an overview of the TeX world while a printed copy is available as Baskerville Volume 9, issue 2. Back copies of Baskerville can also be obtained from the net as can a limited selection of TUGboat articles. Additional information can also be obtained from the comp.text.tex news group.

Insofar as obtaining supplementary packages for your TeX system are concerned, I prefer to use the TeX Live CD or DANTE's three-CD mirror of the Comprehensive TeX Archive Network (see previous article). Files can also be downloaded from CTAN by using your web browser as a CTAN interface or via ftp (ftp.tex.ac.uk) although moving around CTAN is not particularly easy for the novice. One possible solution to this problem is to use Graham Williams' on-line TeX catalogue which is essential for users who require a brief description of a particular file. The novice user can also avail of Peter Flynn's CTAN search engine which can also be accessed from the TUG web site.

Afterthought

So that's it! You should now be well on your way to becoming a TeX aficionado. I hope that I have encouraged you to pick up the TeX gauntlet and learn about what is without doubt one of the most powerful computing tools that you will ever come across.

Remember, the ability to use TeX is limited only by your imagination and by your willingness to experiment. Good Luck and Happy TeXing!


Report/dvi (DVI page 7)

5 Conclusion

- Bullying is experienced by a significant minority irrespective of age and gender.
- Many children were able to give valuable suggestions as to how the problem could be solved.
- Parental involvement in the questionnaire suggests that the problem is a significant one.
- Care must be taken in generalising from the results of this small study to the complete school population. Does the response rate show indifference on the part of those who did not complete the questionnaire or does it tell us more about the method of questionnaire administration?

Figure V: The itemize list environment in action

A good spanking

Fresh back from the South West show, it's time for me to craft another embarrassingly sparse edition of GameShow. If things continue the way they are, I shall have to take out my finest hickory spanking stick and tease info out of certain people who I know are developing behind my back! I'll hold onto my sanity for a little while though to bring news of the nearly complete *Plig II* as well as the verdict on *Castle Harenae*, the freeware two-player maze game.

Before I begin, I must let you know that the platform puzzler, *Wizard's Apprentice* is about to have its price slashed to just £7.90 including VAT and carriage by publisher, APDL, and author Billy Kotsias. Next month, we'll take a brief second look at this title in the light of the price reduction.

Plig II: Son of Plig

Skullsoft have been kind enough to let me see a pre-natal version of this sequel to their popular puzzler; *Plig*. *Plig II* will follow the footsteps of his father with the basics of gameplay remaining more or less the same as in the first incarnation.

The title has been given a new lease of life through the addition of numerous new features. These include vanishing wall blocks, redirection arrows and traps to name but a few. At the time of writing, only a handful of levels have been provided using the new objects but they're quite fun to play and we reckon this'll be a very taxing game indeed if things carry on the way they're going.



Plig in Castle Spatula

In-game sound effects are at an early stage in development but are likely to be of the same high quality as seen in other Skullsoft titles. The new graphics are more or less complete in the preview version we have here and they're looking very nice indeed. Provided your computer's up to it, *Plig* will treat you to some well-drawn in game objects in 32,000 colours at a resolution of 640 by 480. Okay, so it's hardly ground-breaking but at least some effort has gone into their production. An imaginative front-end is already implemented which allows you to select a group of levels just by clicking on an object on the nicely drawn table. Skullsoft (aka: Chris Egan and David Taylor) are hoping to release Plig II around Easter time, keep an eye on these pages (and the CD) for your copy.

Sand Castles

A couple of months back, I took a look at a pre-release version of another forthcoming freeware release, *Castle Harenae*. In case you missed it, this title from David Llewellyn-Jones is a top-down maze game for two. Anyway, the game is now complete and may be downloaded from http://for.mat.bham.ac.uk/llewelld/ch.htm should you so chose.

The intricate plot behind *Castle Harenae* tells the story of how the Greek gods have created another person, the same as you in every respect and placed you both on an island for the ultimate battle. Yes, you each have to construct a maze for the other to complete. With time limits also an issue, *Harenae* can be very good fun simply because you get to watch your human opponent struggle to get around your maze in less time than you take to navigate his (or hers). A maximum of five extra items may be selected for taking into combat prior to the start of a game. These include locks, teleporters and one way arrows just to make your maze that bit more devilish than the other.



A-mazing 2 player action in Castle Harenae

On the whole, *Castle Harenae* is a very enjoyable game. However, the need for a human opponent to pit your wits against can be annoying if everyone you know has given up computer games for Lent. Internet multiplayer would be a nice feature but David may not have enough time to implement it. At the end of the day though, we're talking free games here so you may as well download it from **http://for.mat.bham.ac.uk/llewelld/ch.htm** and give it a try with a mate.

Bye for now...

Whatever you're doing, have a good Easter break and keep on emailing me with details of any pet gaming projects you might have. Cheats and hints are also appreciated. END

Contacting me

Alasdair Bailey:
games@acornuser.com

Topping it

Max Palmer concludes his TopModel masterclass

Last month we finished our tour of *TopModel's* attributes window, so by now you should be confident creating and applying new materials, textures and colours. This month, we'll conclude our look at *TopModel* by examining its import and output features, as well as looking at some tools which we haven't had sufficient space to cover until now.

While *TopModel* is an excellent package for creating 3D models, it is both unnecessary and somewhat masochistic to attempt to model everything from scratch. There are a large number of packages that are capable of producing files which may be combined with TopModel's own tools to create some great effects.

These range from vector drawing applications, such as *Draw* and *Artworks*, through sprite and image processing packages, such as *Compo* and *Photodesk*, to other 3D modelling applications such as *DaVinci* – and that's just on the RISC OS platform.

TopModel provides two levels of support for importing foreign files. The first level includes support for importing Draw, VRML and sprite files directly into *TopModel*.

However, other types of file, such as DXF and 3DS, need to be converted to *TopModel*'s own file format, using the stand-alone *TopImport* utility, before they can be loaded.

TopImport understands 13 different types of file. Of these, the most useful are probably DXF, GEO, 3DS and Lightwave which are all capable of containing geometric information. These are the types of file that you are most likely to come across on the web and are the 'native' 3D formats for some of the principle PC-based modelling packages.

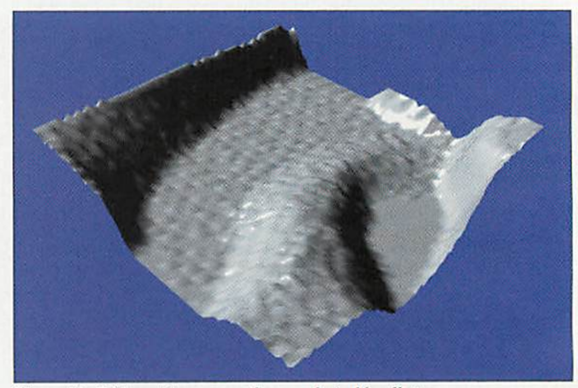


Figure II : Dithered images produce undesirable effects when imported as altitude maps

Unfortunately, *TopImport* doesn't understand all the information that these files may contain, so attributes like texture co-ordinates will be lost. However, in most cases the primary concern will be extracting the geometric information from the file, which *TopImport* should handle without too many problems, although some files may give problems or require manual correction (see later).

The Internet represents a great source of both freeware and commercial models and it is normally possible to find something which is close to your needs, particularly if you're after objects such as aircraft and vehicles. While the quality can vary significantly, it's always worth having a quick search to see if there is something suitable, although you should make sure you check on the licensing conditions that apply.



Figure I : TopImport can be used to import models from other modelling packages

Sprites

In addition to importing 3D models using *TopImport*, you can drag and drop sprites and drawfiles directly. Most of the time, you will use sprites for texturing surfaces or perhaps implementing a displacement map. However, they can also be imported as an altitude map by 'shift dragging' the sprite file into the main window or onto the toolbar icon.

An altitude map, or heightfield as it is sometimes known, takes the form of a regularly spaced mesh

off

which matches the dimensions of the sprite (in pixels). Thus if you were to import a 32x32 pixel sprite, *TopModel* would create a 32x32 point mesh. The distinctive feature of an altitude map is that the Z co-ordinate of a point in the map (imported in the XY plane, for example) is proportional to the intensity of the corresponding pixel in the image. For this reason, altitude maps are best created using a greyscale image, since it is easier to visualise the final three-dimensional surface.

If you do fancy experimenting with altitude maps, you should avoid using any image processing tools which employ dithering. The latter is a technique which is often used to improve the on-screen appearance of an image. Unfortunately though, the effects are clearly visible as discontinuities when the image is converted into a heightmap, so avoid dithering at all costs (Figure II).

Altitude maps can be used to create landscapes or to visualise scientific data as a surface. Both these effects can be further enhanced by designing an accompanying texture map, which in the case of the landscape can be applied from overhead, or in the case of the data, from the side to produce a contoured image (Figure III).

Finally, if you're interested in rendering landscapes, take time to visit the DEM (Digital Elevation Map) Web site listed at the end of the article. This site contains altitude data for the whole of the USA, so if you want to render the Grand Canyon, why not go ahead and use the real data?

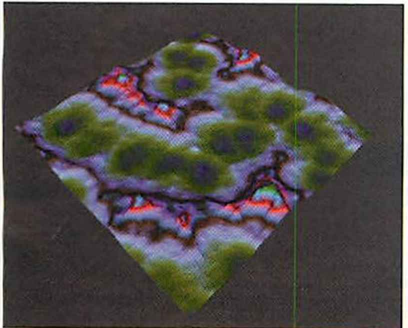


Figure III : A contoured, textured surface produced using an altitude map

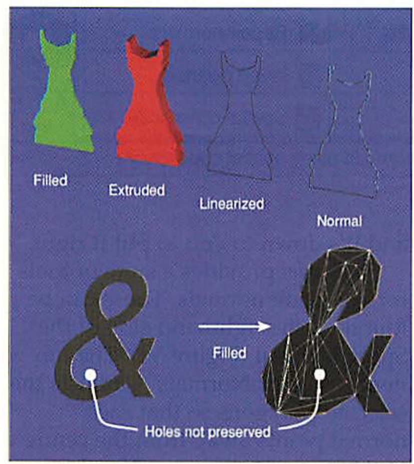


Figure IV : The drawfile import filter offers four different import effects (top), but does not cope well with filled objects that have holes (bottom)

Drawfiles

Those of you who have been following this series are probably aware that I'm a big fan of *TopModel*'s ability to import drawfiles, but have some reservations about its performance. It's great to be able to use *Artworks* or *Draw* to knock up a cross section that can be imported into *TopModel* and extruded or used to create a sweep, especially if you're already used to a particular application's tools.

For example, I much prefer *Artworks*' bezier curves to *TopModel*'s so do most of my initial bezier modelling in *Artworks* and drag the exported drawfile into *TopModel* when I need it. In addition, other applications often have special tools which aren't available in *TopModel*, but do offer drawfile export allowing you to enjoy the full benefits of application integration.

The problem with drawfile import appears when you try to import a filled object which has a hole in it. Unfortunately, *TopModel*'s triangulation algorithm, which is used to create a mesh of polygons from the points in a filled object, ignores any holes leaving you with a mesh that often needs to be manually corrected using the create line/poly tool (Figure IV, bottom). While this restriction isn't a problem most of the time, it can be very annoying when it does strike. But enough of the problems, what does the filter allow you to do? When you drag a drawfile in, you are presented with four choices: You can opt to import it as normal, linearised, filled or extruded. Normal will leave bezier curves as bezier curves, allowing you to produce a bezier surface using other tools, while 'linearise' will approximate curves using straight lines thereby making the object suitable for polygonal modelling.

If you opt for filled import, TopModel will connect the points together to form a net of polygons which fill the shape. Finally, extruded import will stretch the profile along one axis, giving it depth. We'll take a closer look at extrusion in a minute. However, for the moment you can see the effect these four choices have on an imported shape in Figure IV.

Finally, one tip that's worth remembering when creating a drawfile for import is to set the line colour on any filled object to none. If you fail to do this you will end up with a mesh that has an outline that remains visible regardless of the presence of other surfaces between it and the observer.

TopFonts

Perhaps the most common reason for wanting to import a drawfile that contains holes is to create three-dimensional text, as might be required for a Web page banner or spinning logo. Fortunately, Sincronia have recognised this need and have responded with the *TopFonts* plug-in.

The plug-in, which is a separate purchase to *TopModel*, occupies the whole of the lower toolbar (Figure V). To use it you must first select a font, type a phrase into the box provided and choose a preset bevel style (or design one of your own). Next, you need to drag the font icon into the window and *TopModel* will create a 3D mesh at the selected location. The text creation process may take a few seconds and requires the CD to be present in the drive,

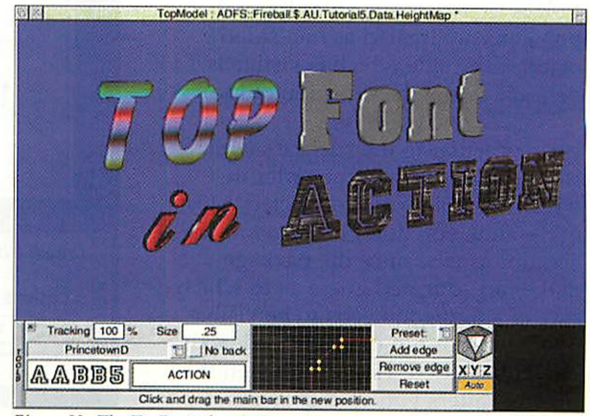


Figure V : The TopFont plug-in in action

Figure VI : The Specials menu

however, once the mesh has been calculated you are free to do whatever you want to it – scale it, apply a texture, and so on. As far as *TopModel* is concerned, it's no different from any other object. A few examples are shown in Figure V.

One note of caution that is worth heeding before you rush out and buy, is that the plug-in restricts you to those fonts supplied on the CD – of which there are over a hundred. Furthermore, you can only use letters and numbers, symbols such as @ and ? will be ignored. The reason for these two restrictions is that the CD contains preformatted objects which are used by the bevelling algorithm. However, if you can live with these limitations then *TopFont* should prove a capable aid.

Problem normals

Anyone who has played around with *TopModel* for any significant length of time will probably have come across the odd strange effect, such as objects that look 'hollow' and phantom polygons which appear seemingly from nowhere. Typically, these problems are most likely to occur when importing objects, or using the sweep and extrude tools.

The cause of these strange manifestations lies at the heart of techniques for storing and rendering 3D graphics and is the result of an optimisation which virtually all packages exploit. Namely, it is much faster to render only one side of an object if you can get away with it. For example, there is no need to draw the inside of an opaque box, since it will never be visible from the outside.

It is for reasons such as these that polygons are treated as one-sided objects. The side which is visible is determined by the direction of the normal (a line which is perpendicular to the surface), which is in turn defined by the order in which the points are connected. Most of the time you don't need to know about normals, since the package makes an educated guess as to which side of a polygon needs to be visible or whether or not the face needs to be double-sided. However, when this process falters you end up with effects like those described above and it's down to you to put it right.

TopModel provides a suite of tools for adjusting normals. These can be found on the righthand side of the Specials menu (Figure VI). The top item – 'Repair Normals' – adjusts the selected polygons so that each normal points away from the centre of the viewpoint (defined by the axis marker). To use it you should select the object to be repaired and use bring to centre (Ctrl+Menu) to centre it at the viewpoint. You can then use repair normals to attempt to correct any problems.

The second option, 'Invert Normals', will flip a normal making the other side of the polygon the visible side. This is useful for correcting rogue polygons, or inverting a whole object which has been created 'inside out' – something that the sweep tool seems to do quite frequently.

Finally, 'Spatial Coherency' tries to intelligently repair a badly formatted object based on its structure. The algorithm examines the properties of neighbouring polygons in an attempt to deduce the correct orientation of the normal using an initial polygon as a starting point.

While all these tools go some way to correcting problem objects, they are not miracle cures and should be used with care. If you do come across an opaque object which is proving difficult to repair, you can always take the last resort, which is to make all of the selected polygons double-sided. This will make your model larger and will slow *TopModel* down, but it should fill in any unwanted gaps. This option can be found on the right hand side of the Edit menu.

Extrusion

I mentioned earlier that it is possible to import drawfiles as extruded objects. However, you are not limited to extruding a cross section along a single axis, you can also apply bevelling and select a path for the cross section to follow. While these options are not available when importing objects, you can always import a shape as an outline, shift it into position and then apply the extrusion tool (on the Specials menu).

A basic extrusion can be made to follow a single, user defined axis, while the number of subdivisions, scale factor and position of the subdivisions can be adjusted using the stepping, envelope and bevelling editors (Figure VII). As expected, stepping will alter the location of the subdivisions while the envelope and bevel profiles set the scale factor that will be applied at a given distance along the axis.

The latter can be accessed using the Setup button. This opens up a window which allows a profile to be defined that will be applied to the subdivisions at the time the extrusion is calculated. However, the editor is a bit awkward to use and the results somewhat unpredictable unless you opt for an unnecessarily high number of subdivisions.

For more elaborate results you can choose to select a path. This will define the 'centre line' of the

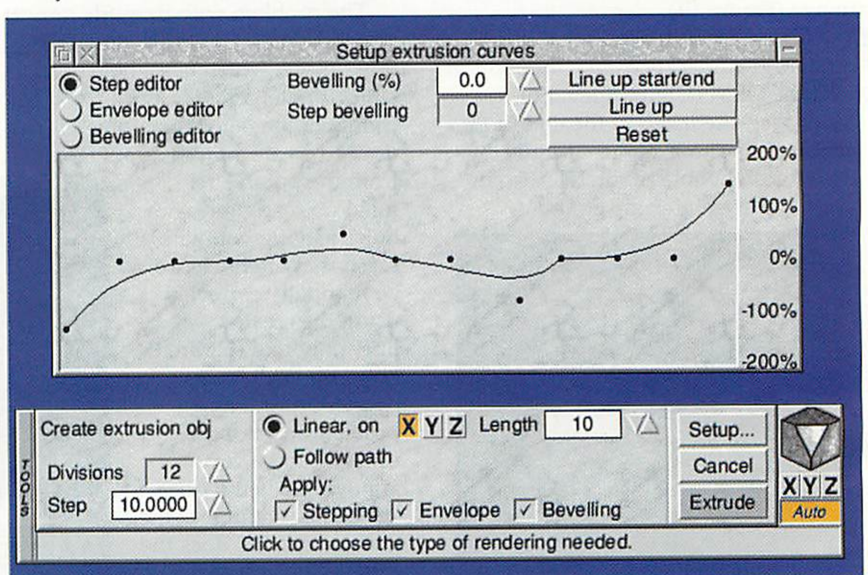


Figure VII : The extrude tool allows profiles for envelopes, bevelling and steps to be created, if required

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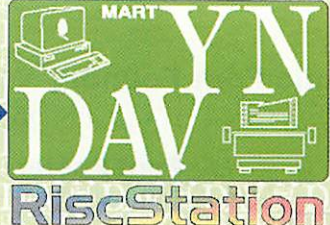
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PC Pro 3 – £70.00
PC Sound Pro 2 – £39.95
Win95FS – £39.95
Windows 98 CD – £100.00
Psion Series 7
16Mb, with PSU etc. – £679.95
Memory Upgrades
Please call to check current prices.
Other upgrades are available.
A3000 1-4 Mb – £64.60
A3010 1-4 Mb – £66.00
A3020/A4000 2-4 Mb – £49.00
A5000 2-4 Mb – £55.00
A300, 400, 5000 4-8 Mb – £128.00
Risc PC/A7000 FPM SIMMs:
Call for EDO SIMM prices
16Mb – £28.20
32Mb (not original RPCs) – £51.45
32Mb (high clearance) – £73.50
64Mb – £90.00
128Mb – £225.00
1Mb VRAM – £45.00
1-2Mb VRAM swap – £55.00
2Mb VRAM – £92.00
Music & Sound Section
Please call for other musical items
MIDI interfaces:
DMI 50 dual MIDI card (2x2) – £119.95
DMI 50XG – £259.95
XG upgrade for DMI 50 – £151.95
16-bit sampler for DMI 50 – £87.95
MIDI Max II internal 1x1x1 – £92.75
Parallel Port 1x1x1 – £89.20
Synth 8 or Basic Synth – £46.95
Synth Plus – £58.65
Music & Sound Prog. Guide – £16.95
Other hardware:
Fatar SL 760 – £450.00
Fatar SL 880 – £600.00
Fatar SL 1100 – £800.00
Fatar SL 2001 – £1050.00
Irlam i16 sound sampler – £118.00
Digital-upgraded Irlam sampler – £177.00
MIDI upgrade for Irlam sampler – £Call
Sound Byte Recorder – £57.50
Yamaha YST-M8 speakers – £45.50
YST-M20 DSP speakers – £65.75
YST-MS28 speakers & subw. – £79.95
YST-M100 speakers – £117.00
YST-MSW5 subwoofer – £59.00
YST-MSW10 subwoofer – £71.20
Yamaha MU10 sound module – £169.00
Other software:
MediaPack – £23.95
MIDI Support – £18.50
Prosound – £116.95
Rhapsody 4 – £94.95
Junior Sibelius – £49.00
Sibelius 6 – £99.95
Sibelius 7 Student – £319.95
Sibelius 7 – £520.95
Sibelius for Windows is also available
Optical Manuscript – £259.00
Sound module serial driver – £37.95
Studiosound – £116.95
Other Hardware
Dual fast serial card – £90.00
Ethernet card (Combi NIC slot) – £116.30
Hard drives & kits – £Call
RPC second slice (no PSU) – £90.00
RISC OS 4 (fitting available) – £120.00
StrongARM & RISC OS 3.7 – £259.00
StrongARM & RISC OS 4 – £299.00
Other Software
Ankh – £23.00
ANT Internet Suite 2 – £112.00
CD Burn – £55.95
DataPower 2 – £165.00
Doom+ CDs – £30.00
EasiWriter Pro – £129.00
Empire Soccer 94 – £22.00
Exodus – £21.00
FastSpool+ – £17.60
Frak – £14.95
Impression Style – £88.00
Impression Publisher – £135.00
Inferno – £9.50
iXRC – £14.99
Ovation Pro – £142.50
Personal Accounts 3 – £43.00
Photodesk Light – £125.00
Prophet 3 – £160.00
Schema 2 – £116.00
Sleuth 3 – £110.50
Textease – £54.50
TopModel 2 – £145.00
Books & Manuals
RISC OS 3 PRM – £30.00
Manuals CD – £Call
Catalogue
Our free catalogue contains over 2000 items. Please ask for a copy.
We will attempt to match or beat any advertised price – even special offers.
All prices INCLUDE VAT & UK carriage
Official orders and callers welcome. Finance available.
VISA
DELTA

Figure VIII : Paths can also be used in conjunction with the copy tool, to produce chains or branched objects

extrusion and will dictate the position of each of the cross sections which make up an extruded object. To use this option you must first define a path, using the path setting menu (F2) – you cannot use a path produced using the 'create path' tool on the Create menu.

Once you have created a path you should be careful to position your cross section at the right location before applying the extrusion. Remember you can always save your scene to memory by pressing the spacebar before you invoke Extrude, enabling you to tune the parameters until you get the result you're looking for. Another useful option that appears on the path settings dialog is the 'normal to path' checkbox. If enabled this will ensure that each subdivision is oriented so that it lies at the same angle to the normal to the path (at a particular location) as the first cross section.

Paths can also be used in conjunction with the copy tool, allowing you to build chains. You can also opt to rotate or scale each copy with respect to the previous object, enabling more complex effects to be achieved. All these options can be found on the Setup menu for the copy tool, which is located on the Edit menu. I've used the copy and extrude 'along a path' tools to create the tendrils for a houseplant (Figure VIII). In the case of the copy tool I first created a path for an individual stem, using four segments. Next, I positioned a hourglass-shaped 'node' (of the tendril) at the start of the path and applied the copy tool, with 95% relative scaling set in all three axes. After iteratively adjusting the position of the control points I managed to create a stream of connected segments which I used as the skeleton for one branch of my plant.

The remainder of the structure was built up using a number of leaf templates positioned along the path. Each leaf was assembled from two sets of objects: a group of leaves each made from a distorted plane and a set of leaf stalks which were made by deforming a five sided bezier surface (Figure IX). By choosing a bezier surface I was able to create an initial object which I cloned and tweaked to quickly create five derivatives which were then converted into polygons. Finally, the two sets of objects were assembled to produce a variety of leaves and suitable textures applied. The final result proved to be a good match to the original plant and is shown in Figure X.

Final output

We've already seen that *TopModel* supports an impressive variety of foreign file types. However, it is equally important that it offers a similar level of support for exporting files to the outside world.

As with import, *TopModel* provides two levels of export support. The first allows you to directly export a scene as a variety of native file types, for example a 3DScene, sprite and drawfile. While a stand-alone utility has been created which allows a *TopModel* ASCII file to be converted into a number of foreign file types.

Of the six direct export options, two are native to *TopModel* (3DModel/3DScene) and the

3D Model links

http://www.viewpoint.com/
http://www.3dark.com/
http://www.amazing3d.com/
http://www.cacheforce.com/
DEM Website
http://www.edcwww.cr.usgs.gov/doc/edchome/ndcdb/ndcdb.html

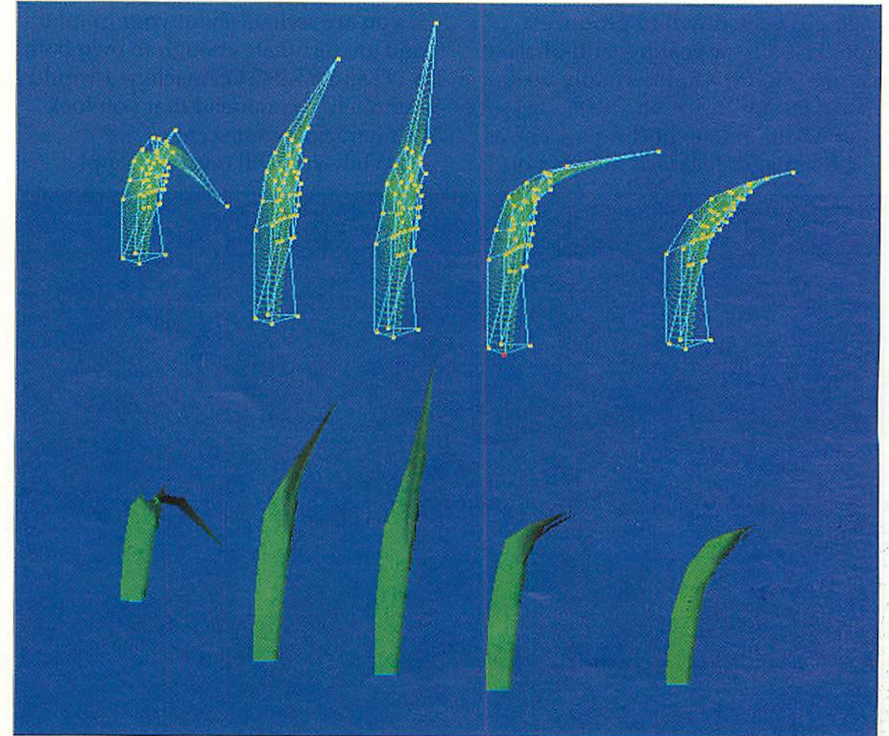


Figure IX : Bezier surfaces are great for quickly creating a number of similar objects



Figure X : The finished houseplant

freeware, stand-alone application – *TMViewer* (3DScene). A third type, ASCII, is simply a human readable file which is used by *TopExport*. The remaining options are picture, movie and drawfile.

Unsurprisingly, the picture option allows you to save a scene as an image which can either be a sprite or targa file. Since the resulting image can be quite large, *TopModel* allows you to specify the colour depth as either 16 or 24-bit. You also need to choose the output resolution of the rendered image. If you opt to take a 'snapshot', the dimensions of the image will be set to those of the current work area.

However, you can also set the resolution to be two or four times that of the current work area. This is useful for exporting an image to a bitmap package with the intention of scaling it back down to produce a more visually appealing, anti-aliased picture (Figure XI). I normally use *ChangeFSI* for this task.

In addition to exporting a scene as a static image, *TopModel* allows you to save an animation. Unfortunately, *TopModel*'s animation facilities are very basic and only simple effects such as interpolation between named views and rotation about an axis on offer. While these features are fine for producing simple Web-based graphics (spinning logos, and so on) they are inadequate for producing any serious animations.

Furthermore, a fair bit of massaging is required before you can convert the frames into an animated GIF using *InterGIF*, for example. This makes viewing your animation both tedious and time consuming. I'm therefore forced to conclude that until we have better animation facilities, such as those promised by the much-delayed *TopMotion*, animation is best left to other packages.

Fortunately, *TopModel*'s drawfile export is much more effective. It allows a scene or selection of objects to be exported as either a wireframe, wireframe and filled or lit view. The latter offers similar image quality to that of the flat shaded mode with both texturing and transparency disabled, but has the added advantage that the scene can be rescaled outside *TopModel* without sacrificing image quality. Figure XII shows a scene that has been exported using this mode.

Beyond RISC OS

If you are serious about your graphics and are fortunate enough to own both a PC and a RISC OS machine I would definitely recommend that you look at raytracing your scenes.

While you will need to reapply materials and textures to your objects, the results can be really stunning. In order to be able to load your models into a foreign modelling package you will need to convert your *TopModel* objects into a format suitable or use on another platform. This may be done using *TopExport*, which accepts *TopModel* ASCII files and converts them into DXF, GEO, VRML or POVray files.



Figure XII : A lit drawfile exported by TopModel

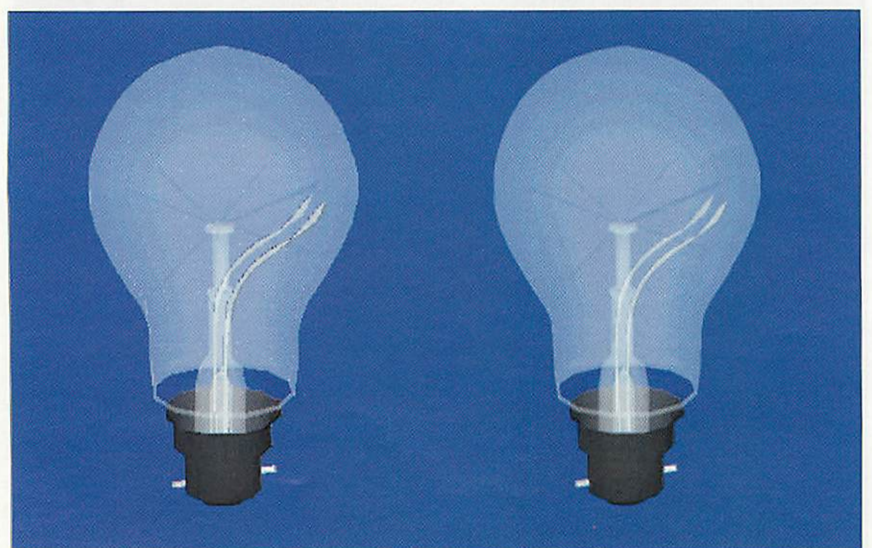


Figure XI : An anti-aliased image can be produced by rescaling an image by 50% in an external package

While the last of these formats is not really well enough supported by *TopExport* to be of any real use, *TopExport* produces DXF files which most foreign modelling packages should accept without any problems. In addition, I am currently working on a PC-based utility which will convert a *TopModel* ASCII file into an OBJ file, which I will investigate making available at a later date.

Signing off

It's been my aim throughout this series to give you a glimpse of the kind of applications *TopModel* is capable of tackling. We've looked at a number of *TopModel*'s tools and have seen how they may be combined to produce some interesting effects.

Although I haven't been able to cover everything, hopefully in exploring *TopModel*, I've prompted a few of you to investigate the wonderful world of 3D graphics and managed to help some others make progress with what can often be a difficult, but immensely rewarding package.

As ever, my advice to you is to keep exploring and keep practising. In my opinion, the rewards are worth it. Happy modelling! END

Product details

Product:	TopModel £152.75, TopFonts (requires TopModel 2.14) £49.95
Supplier:	Spacetech, 1 The Courtyard, Southwell Business Park, Portland, Dorset DT5 2NQ
Tel:	(+44/0) 1305 822753
Fax:	(+44/0) 1305 860483
E-mail:	sales@spacetech.co.uk
Web:	www.spacetech.co.uk

Moving experience

Simon Anthony spins a new theme

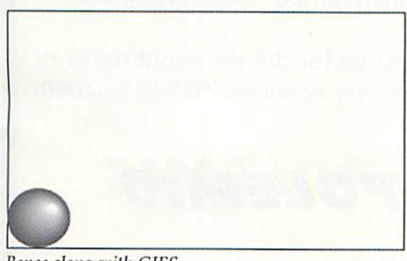
The Web is a toy of today – but most of its bright and brassy embellishments don't so much enhance the browsing experience as get in the way. Current fashion, thankfully, is to have less clutter but it is nice to have something to look at. This is where *Draw* comes in.

The most cross-platform, cross-browser components of a Web page – apart text – are graphics; and the most eye-catching of these are ones that move. Usually "animated GIFs". A single animated GIF (Graphics Image Format) is really a set of picture files saved in a compacted form as a single file and the frames are displayed sequentially in a web browser. There is a program which will make these GIF sequences from *Draw* files. This month will cover how this can be done – for free.

The first thing is to go and get the animated GIF maker *InterGIF* mentioned last month. Peter Hartley wrote it as freeware, or at least not explicitly copyrighted other than with a K – see his notes. It can be obtained from the author's Web site at **http://utter.chaos.org.uk/~pdh/software/intergif.htm** which worked when I last tried it. There are full instructions with the program so if anything is not clear to you, read the manual.

Start by creating your main image – the one you want to animate. As this is a *Draw* series that is what we'll use. Care at this stage is all important. As *Draw* images are a composite of individual 'objects' these can be moved around, and each movement stage can be a frame in your animation. Basically, that's it. Have a look at the GIFs that go with this article to see what can be done.

The bouncing ball is almost the simplest possible animation: The ball moves inside a stationary box. Draw the box and put a ball in it. It is essential that the box does not move between frames as it defines the size of the final GIF and must not alter during the animation. *InterGIF* will refuse to accept files of different height/width sizes anyway. Save the first file as '00'.



Bonce along with GIFS

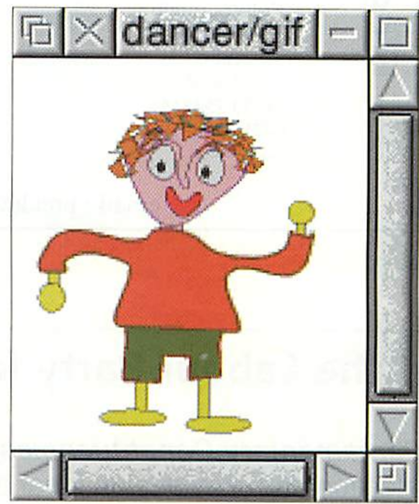
Name subsequent files as '01' and so on up to '99' – I expect that you could have more than that but I've never tried. Next, process them in *InterGIF*.

To enable the best compression of the file, don't turn on the interlace option. The 'Join input files' box is ticked as we dragged and dropped group of drawfiles from the Filer window. 'Set delay' is 8 centi-seconds between frames by default. I set it to 14 here because the physical distance between my frame steps was too great for such a high rate of display, so I slowed it down a bit.

That made it more jerky but more reasonable for a ball's movement. I had moved the ball from one grid lock position in *Draw* to the next diagonally until it hit an edge, but the gap was too big… I also did a dancing man, the arms and feet of the cartoon character were moved between frames, sometimes the hair was mussed up a bit or the eyes crossed. It is shown dancing away on my **www.nicerlife.com** site if you want a look.

There are two ways to turn your pictures into animations, you can either save each drawfile as a frame, or you can take a snap of it at each stage of the animation process. The advantage of the first technique is that you can undo it. On the other hand, taking sprite snaps of each frame gives you control over every single pixel in the final animation.

Fine detail such as a glint in the eye can be added this way, but it would be pointless to make up sprites of the whole sequence to just alter one of them. The trick here is to



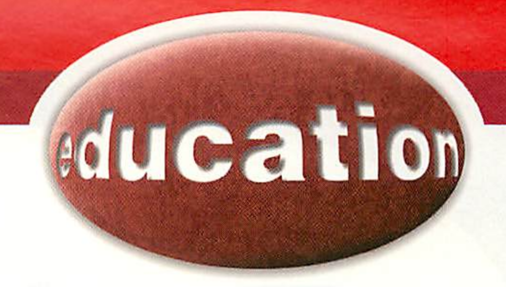
use other facilities of the animation maker. Once the draw files have been turned in to a single GIF file, the file can be split up in to sprites again.

Then the offending frame can be sprite manipulated in *Paint* and then re-saved. The group of sprites then can be fed back in to *InterGIF* to make a new, edited animation file.

Some experimentation is required at all stages as the results may not turn out as expected. The background colour of the animation will either have to be exactly the same as that of your Web page – as displayed in all possible screen modes – or it should be transparent if you don't want a visible box around your animation. The bounding box in the original DrawFiles does not have to be black, it can be set to 'nothing' to make an invisible border. END

Contacting me

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Logging on

Logotron (01223 425558) have announced the launch of Insight 3. This will be a familiar product to anyone involved with science and datalogging at Key Stages 3 and 4.

This new version promises many new features such as a facility for learning support comprising of a range of difference talk-through tutorials and on-screen help, further helped by sample experiments and general instruction in basic skills.

The aim of this tutorial aspects to develop investigation skills in analysing and interpreting data from experiments. A management program monitors student's progress and diagnoses errors, as well as offering advice with students' data available to teachers in various formats including summary scores and skills profiles.

There is a facility to display a powerful fast-logging option enabling students to record data at up to 100 samples per second in *realtime*. With improved designs for displaying data, all dialogues now have pop-up menus and usability is increased by a large built-in range of keyboard shortcuts.

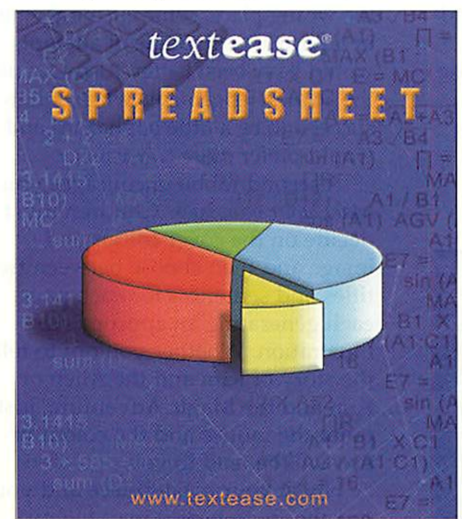
Insight 3 costs £79 for its graphical methods for selecting, comparing and analysing data. A zoom feature offers magnification of up to 50 times and there is a new intelligent system for converting the units for a time axis. You can also import CSV files from other programs allowing you to analyse them within Insight 3.

Soft options

Softease (01335 343421) have produced a powerful new numeracy tool, *Textease Spreadsheet*. You can use it to create simple tables or complex mathematical formulae depending on your needs and levels of use.

There are definite similarities to Softease's award-winning word processor-cum DTP package, with a simple front end and fully configurable settings and icons. Teachers can customise the program to meet an individual's or group's needs. Some particularly useful features are a selection of preset mathematical formulae, number sorting, lockable cells, graphing facilities which regenerate automatically as data is changed and a range of number formats – decimal, percentage, currency, date and time.

Another nice feature is that fact that you can run the spreadsheet as a standalone program, over a network or integrate it with the updated versions of Textease, Textease 2000 or Textease Primary. The price is £39.



Diary date

Design & Technology with Science Education Show 2000
NEC, Birmingham
9-11 November 2000
Free entry
Further details: 01425 272711 or www.ichf.co.uk
Only open to teachers and education professionals with a daily programme of talks and seminars. Much of these focussing on the revised Orders for the National Curriculum

In brief

Help on hand

If your school hosts a range of technologies it can be hard to keep on top of all the applications. If you want a hand then Educational Multimedia are offering a possible solution in the guise of www.shortcutz.com

What you get is free access to one-page easy reference guides containing helpful hints when getting started with the more popular of PC applications.

These have been divided into different sections: spreadsheets, word processing, databases, Internet applications, project and content management, presentation, graphics and multimedia.

Whether they need to do the same for RISC OS applications is debatable, but could be useful.

Artful applications

IF you want to do more with your finished artwork, then take a look at TinyArtPlus. Produced by Topologika (01326 377771) you can draw, paint and full and then turn your pictures into jigsaw puzzles.

Aimed at Key Stages 1 and 2, and based on the original TinyArt, children can use the package to explore symmetry and rotation helped in the creation process with five sets of picture stamps and four sets of outline pictures to colour in. Teachers can also choose which tools are turned on or off. Available on floppy disc, the cost of TinyArtPlus is £30.

If you want to see the program in action, then take a trip to the New Walsall Art Discovery Gallery where it is featured in the children's hands-on art exhibition.

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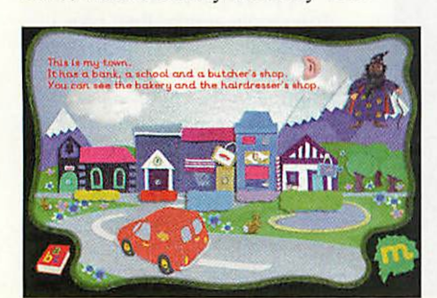
Primary le

Primary Numeracy and Primary Literacy are two sides of a new series supporting the NNS and NLS respectively. This issue I'll be looking in detail at Primary Literacy, of which only Years 1 and 3 are available as yet.

The aim is to present children with activities following the Literacy Framework document, and to help teacher's planning by laying down exactly which parts of the word, text and sentence level curriculum each activity covers, helping further with a manual stuffed with supporting activities and worksheets.

The fuzzy-felt type graphics are attractive and effective and I appreciated the mix of adult and child voices. You can opt to have the program presented in full-screen or desktop modes. The main menu screen offers a mortar board to give you coded access to a progress chart for each child. Alongside all the activities is a dictionary icon which allows children to go to any letter. This automatically opens at A telling you that A is for apple, showing you how 'a' is formed and offering four 'a' words with their definitions.

Move your mouse over a word to hear its pronunciation and definition. Sound and graphics are both clear. From here you can open any other letter that takes your fancy or return to the main program. The look and feel is the same for Literacy One and Three but the words you'll find in the dictionary, the characters and the activities are focussed on their specific year group. Both programs divide the 16 activities equally between word, text and sentence level, with Primary Literacy One





these are accessed by clicking on the Robot, Wizard or Pirate.

Click on the Wizard and you'll find him surrounded by four rabbits. Move your mouse around and you'll be shown and told the name of the activity: Which came first?, Making a book, Spells for beginners, and My town.

Opting for *Which came first?* and a static wizard will introduce you to the talking story of Gerry, Joe and the Giraffe. As the tale is told each word highlighted and you can turn the page or wait for the page to turn automatically. The fuzzy-felt illustrations are replaced by excellent plasticine figures.

The sentences are long and quite complex with a lot on screen for some children, so extra support will be needed. However, the story runs straight into a sequencing activity. Children can try and try again to get the pictures in the right order, nothing happens when they put a picture in the wrong place, some encouragement or advice after a couple of attempts would have been better. Also I found the acknowledgements when children succeed to be a little haphazard and I would prefer more consistency.

A second rabbit encourages you to *Make your own book*. Children must decide on the cover colour and image and then choose between two titles and sentences for each page each generating an appropriate illustration. Whether you opt to tell the story of Kim and the Alien or Kim and the Magic Adventure, just point the mouse and the colour or text will be read to you.

Finish your masterpiece and you can choose to hear it read to you, write another, or find out about other books. The last option sounded intriguing and opens an illustrated narrative on different books from a recipe book to an atlas.

Moving on to *Spells for beginners*, this was a little complicated to workout when in essence you are picking up items which make themselves into a rhyme. First children choose a word from the shelf and add other ingredients surrounding the cauldron from rope to dragons. When the cauldron starts to boil your spell is read to you. You can't print these out which is a shame but you can save any screen as a sprite file and then print later.

Finally in this section is *My town* which is a little fiddly as you pop labels on to pictures of shops, items in a classroom, school computer (an iMac!), park and bedroom. This finishes with advice from the Wizard on making labels for things at home or school.

For word level activity the Robot offers four clockfaces which offer six games of pelmanism/pairs matching upper to lower case letters. An interesting note is that the programs use and explain the terms they use whether upper case/capitals or personal pronouns in Year 3.

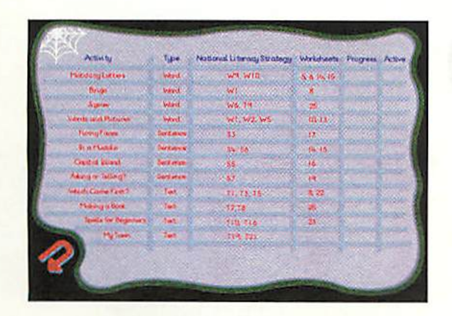
Also on offer for word level is *Bingo* with nine illustrated cards. Click on the ear icon and listen carefully. You then, for instance, have to click on the words which uses the oo sound. You'll be congratulated for getting a line or all four corners, but what you're after is Full House and there are six games to help with this mostly medial sound identification. It is essential you have the sound on for this game as you





tters

Learning your A B C can be as easy as 1 2 3? Pam Turnbull looks at a new series from Anglia



need the pronunciation to decide which *read* the program requires.

Words and Pictures presents you with six cloze procedures complete with images as clues. You can just click your way through the possibles as the words will only stick in the right place and no advice or limited number of tries is implemented here. When correct the page is read to you before you move on to the next. At the end can opt to hear the story in its entirety.

A pirate offers sentence level activities: *Capital Island* practice the essential skill of starting a new sentence, the first letter of a name and I with a capital. Children are shown sentences which they change the case of by clicking. There are 12 exercises and when the sentence is correct it is read out.

I liked the logical thinking behind *In a Muddle* where you must click arrows to put muddled up sentences into the right order. While *Funny Faces* is a listening activity where you must listen to what and how sentences are said and decide whether the speaker is sad, happy, angry or puzzled. Finally *Asking or telling* really appealed to my test group. By choosing the questions rather than the statements you get clues as to where the buried treasure is.

Primary Literacy Three has the same layout and graphic style but this time featuring an astronaut, engine driver and deep sea diver.

Word level work is introduced by the engine driver. Homonyms are explored as you read a piece of text and you've got to decide which picture illustrates the correct definition of *wave;* a hand or a seascape. A nice idea though can be a little hard to tell what some of the images are.

Another good idea comes in *Spell check.* The driver has written a story but he's unsure about the spelling of some words, he's highlighted them for you to check. Click on them to see alternative spellings. The piece is read out when it is correct.

Syllables come into play in *Jackpot.* You must play the fruit machine to put together two syllable words such as Mon-day or Fath-er. This is a better consolidation activity than an introduction exercise.

In *I Spy* you can see the continuation from Primary Literacy One. You're presented with different labelled scenes. As you move your mouse over the park, kitchen, bedroom and beach the label names are read out, your task is to find the matching sound. Don't hear it the first time? Click on the ear, and as with all the activities click on your host for instructions if you forget what to do.

One of my favourite activities is *Is that a fact?* After a brief introduction you listen to/read a story. You then have to sort statements about the story into opinions and facts. Here you must read the sentences as this is one of the few times sentences are not read to you.

More listening skills are involved in *Under the sea* where again you listen to a tale then have to order the events in a sliding block puzzle - fine if you are any good at sliding blocks. A nice point about this and the previous activity is that you can go back to the story to check your facts.

A typewriter introduces you to an activity where you are *Writing letters.* After you have entered your name and address, you have to choose one





of four people to write to: an auntie, teacher, French penfriend or children's author. You are then offered a selection of four paragraphs. From pages of these you build up a letter. Children can click at random but the skill is to read carefully and fit together a logical letter. This will make a good resource for a lesson on letter construction, with advice on ending your letter with *Best wishes, Love from* or *Yours sincerely.*

For sentence level work your guide is the astronaut. Similar to earlier activities children read/listen to a talking book (a variation on Jack and the Beanstalk) before putting certain events in the correct order.

Possessive and personal pronouns are covered in *Spaceman* and *Rockets.* In the first you must change the story to make sense adding his, her, their, our, your and my. While in the second you match the right personal pronoun to the planet holding *are, is* and *am.*

Primary Literacy Two (for Year 2) is due out soon and this promises to be a useful scheme though it does need tweaking in parts. A promising extra is a weblink for updates and extra resources. **END**

Product details

Product:	Primary Literacy One and Three
Price:	£55 (each for the Education versions)
Supplier:	SCA (Anglia Multimedia), PO Box 18, Benfleet, Essex SS7 1AZ
Tel:	01268 755811
Fax:	01268 755811
E-mail:	scauk@aol.com
Web:	www.anglia.co.uk

Taking control

Mike Cook gets (one) wired

In the last few months we have looked at the Dallas One-Wire bus or microLAN and used a simple serial interface to generate the pulses and read the data from it. While this is fine for many applications it does have two disadvantages:

It relies on serial data speeds that can only be achieved using a Risc PC, thus disenfranchising those with older machines. Secondly the interface has what is known as a floating earth, this means that the earth of the One-Wire bus and the earth of the computer are not at the same potential. Even worse the data earth changes potential with respect to the computer's earth as the bus signals are produced. This in itself doesn't pose a problem except when the devices require external power, then you need to make sure that the power supplies are also floating.

This concept of floating earths often confuses beginners and I suppose this is due to the words used, historically they came about from one of the first uses of electricity. Voltages are more correctly known as potential differences and it is these differences that are measured in volts. One of the first applications of electricity was the electric telegraph, signalling remotely by detecting the voltage across a pair of wires.

It was soon found however, you could get away with only using one wire if you used a large metal plate buried in the ground at each end to substitute for the other wire. If you were stringing wires between towns this gave a substantial saving. Thus it became convenient to talk of voltages with respect to ground or earth, it was a common point of reference.

Later, when signals were amplified, the circuits still needed two wires in the signal path, one of which could be thought of as a common point of reference. This signal became known as the common or earth signal. Due to safety concerns this common connection was actually connected to the real earth so that any short circuit to a metal case would cause large currents to flow to earth and blow the fuse.

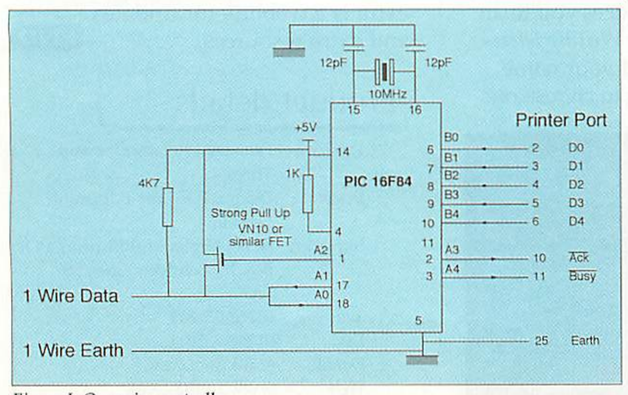


Figure I: One wire controller

Without this, under fault conditions, the casing could have a high voltage with respect to earth and anyone touching it, who was already earthed, could experience an electric shock. Interesting to note that you have to be earthed to get a shock so you could consider that it is the earths that are dangerous, a point that some of my readers in the past have had great difficulty understanding.

Anyway the zero volts line from computers are also connected to the real earth through the mains plug, but this should not happen with power supplies, we say they have a floating earth. This means that if we have a power supply with a + and - terminal we can get a positive or negative voltage from it by connecting the appropriate terminal to our common, or reference wire. However, some power supplies, and especially split supplies, that is ones giving both a positive and negative supply, sometimes have their common terminal grounded to the real earth.

I came across a perfect example of this a few years ago when Alec acquired a number of guitar effects pedals, the output of one fed into the input of the other with the signal earths connected together. This worked fine if each effects pedal was powered by batteries or its own separate supply. However he thought it would be more convenient if they all used the one power supply and so he made up a lead with lots of plugs.

This was a disaster because some effects had earth-lift resistors in them, that is a resistor between the signal earth and the power supply zero volts to reduce hum and interference pickup. When all the power supplies were common these earth-lift resistors conducted large

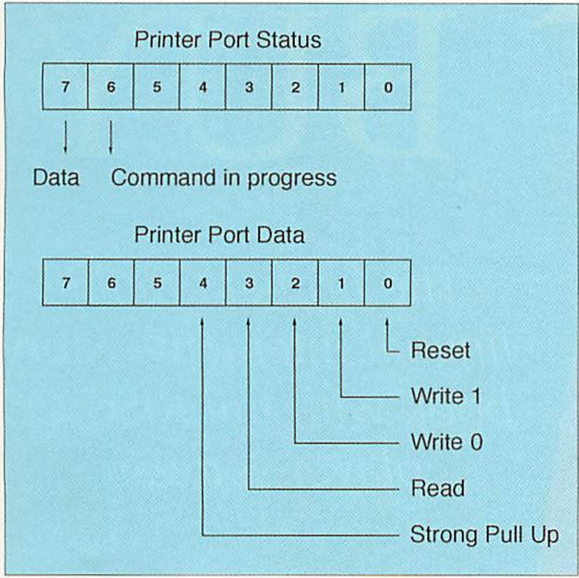


Figure II: The programmers model

currents and burnt out. So it's not always straightforward coping with earths when connecting things together, hence I looked at a way to eliminate this problem from the One-Wire interface. One solution I looked at was the Dallas DS2480B One -Wire bus controller. This connects to a serial port and can use it at any speed, it also has the advantage of being able to communicate in bytes so the computer doesn't have to gather all the individual bits from the bus into bytes. However, there are a number of things about it that are not so convenient, first it is only available in a surface-mounted package and secondly it wasn't stocked by any supplier I could find. I might come back to this device later but for now I have chosen another solution.

It is perfectly possible to write software that generates the pulses needed to control the bus, the big problem is that this software would be different for each model of computer due to different clock speeds and cache configurations. When everyone had a Model B life was easy, you wrote a small loop in machine code and this produced the same delay on everyone's machine.

Nowadays software timing loops are a thing of the past if you want the software to be able to run on more than one machine. So what we need to do is to control the timing externally and generate precision pulses from computer commands. One way of doing this would be to use monostables to generate pulses from edges, however the pulse times are derived from capacitors which normally have a 20% tolerance so they would need setting up with a trimming resistor and an oscilloscope. Worse still: the capacitor's value changes with temperature so the timing is not too stable.

My solution to this is to use a PIC controller, this controller allows you to use the old-fashioned technique of software timing loops and a crystal-controlled clock ensures they are accurate and stable. All we need is for the PIC to generate three different lengths of pulse, reset, write 0 and read/write 1.

Figure I shows my circuit for doing this, basically five lines from the printer port are connected to Port B of the PIC, each one of these lines is used to trigger a different type of One-Wire bus command. The bus itself is connected to A0 and A1 of the PIC, one being used as an input and the other an output. I could get away with using only one port pin here and make the software reconfigure it as required but it's much easier to use two.

The A2 line is connected to a FET to provide a strong pull-up when One-Wire devices need to take power from the bus. In effect it connects the data bus directly to the power supply. Using this the temperature sensors we looked at the other month could all be made to do a temperature measurement simultaneously, instead of one at a time.

However, this is optional and you could leave out the FET and the interface would still work. If the strong pull-up were enabled when a device was trying to pull the data line low it would burn out that device, the software in the PIC and the computer must make sure this never happens. If you are unsure you could leave the FET unconnected until you have your system working.

Two other lines, A2 and A3, are used to signal back to the computer, one indicating that a command had finished and the other indicating the data read from the One-Wire data line. These are connected to the handshaking lines, thus allowing even computers with a single direction printer port to use this circuit.

Figure II shows the interface from a programmer's point of view, normally all the outputs from the printer port should be at logic zero and when a command is needed the computer puts the appropriate line high and then low again. As the line is brought low the command in progress goes high and the command starts. When it is finished the command-in-progress line goes low and the data read back from the bus is on bit 7 of the status register is valid.

You need to ensure that there is not a command in progress before issuing a new command to the interface but in practice if you are programming in BASIC this only applies to a reset or strong pull-up command as the other commands are so quick. Note the data returned from a reset command indicates the presence of devices on the bus. If a write 0 or write 1 command is issued with the strong pull-up bit set then after that command the data line will be pulled up to the supply for 500 mS to allow a temperature conversion to take place.

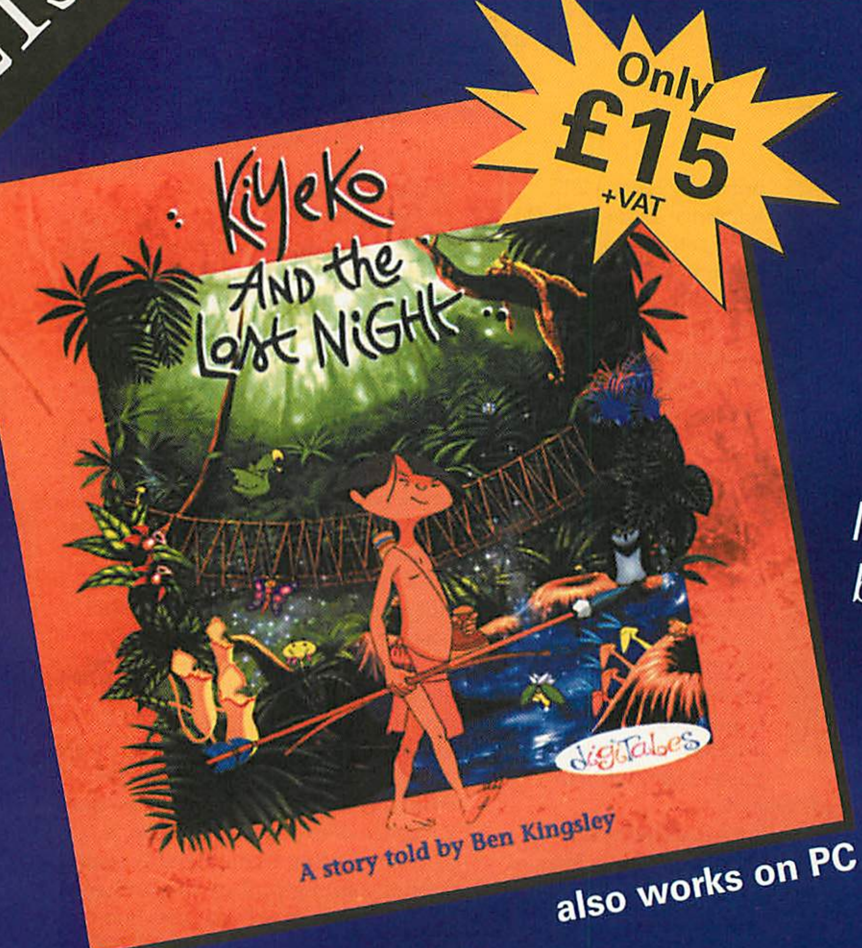
Therefore your software should ensure that this is only raised on the last bit of a temperature convert command. Note here that if you require a strong pull-up for any other time period you could use one of the three unused bits of the printer port and modify the PIC code accordingly.

The only thing in the PIC code that might not be straightforward is the read section. Here the responding device can pull the bus low at any time in a certain time window so you don't just want to sample the bus once. Instead we start off assuming the bus is at a logic one and so set the data bit high. Then we continuously read the bus for the duration of the window, if at any time the bus reads a zero we clear the data bit. Note it is never set again even if later in the window it goes high again. In this way we ensure we see even the briefest response from a device.

The code for the PIC along with examples of using them are provided on the Internet and cover CD.

So that about wraps up the One-Wire bus for the moment, as more devices become readily available, or applications require it I am sure we will revisit it some time. Next month, something completely different. END

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RISC OS



Mike Cook and the fool on the hill

Reading about Julian Coleman recordings of the mud flats through the New Year celebrations reminded me of a strange CD I have just acquired. It's called "Drone Hill 225" and is a recording of the noise made by a pair of electric fences fitted with the same sort of piezo-electric transducers I used in my MIDI drum project of November 99.

Ritchard Harrison has spent three years recording the fence in all weathers and this CD is just a small sample of his output. I think he used different arrangements of pickups to get a very atmospheric variety of sounds from the fences that cover most of the hill side. It's available on Hot Air Releases with a catalogue number of Airdale 011 and the front cover is a section of an Ordnance Survey map of where the recordings were made. I haven't tracked it down exactly but I think it's east of Edinburgh.

Incidentally Julian Coleman said he could offer readers a commercial service for putting their tapes onto CDs.

Back at work, at Pace, I am actually getting to use an ARM chip in one of my designs. I can't say exactly what it's about but one of this month's news stories should give you a bit of a clue. I'll let you know when the project is finalised.

This month in my hardware section I am using a PIC micro controller again, someone once asked me if I had any plans to develop software for a Basic Stamp but I have not. A Basic Stamp is a single-chip controller similar to a PIC but with a built-in BASIC interpreter.

With this you can produce standalone projects with the software written in friendly BASIC. It's not the same as the BBC BASIC that is in our computers but a much smaller subset.

However there is support for Acorn machines and free software too if you are a school, take a look at **http://www.tep.org.uk/stamp/st_acorn.htm.** If you must there is also support for DOS and Windows 3.1 & 95/8.

Now Gareth Cumella has been keen to understand the workings of the RISC TV card and why it appears to not need any screen memory to do it's job:


"I understand the general overview of how RISC TV works, but some things are still not quite clear. You said that a digitiser converts an analogue signal to a digital signal, which I assumed included RISC TV's. I was doing a bit of research on monitors and TVs, and I discovered that monitors and TVs both use analogue signals. If this is the case, the signal coming from the TV source will be analogue and will not need to be converted to digital, so what is RISC TV's digitiser used for?

"If the signal was being converted to digital, then plotted on screen in the conventional way, it would have to use VRAM wouldn't it, but the signal would then have to

Before long this explanation had Gareth thinking, which by the very nature of the beast generated more questions:

Q **"This is just a quick e-mail, to say thanks for the info on RISC TV, it makes a lot more sense now than before. I was wondering though, if RISC TV makes use of a method which requires no processing power whatsoever (that includes VRAM), why don't all these graphic/3D accelerator cards follow the same example, the G-Force 64Mb card, instead of using all that VRAM and processor power? Is it to do with the fact that sprites or bit-mapped graphics, that is graphics formed from code, are in a digital form?"**


The RISC TV has a video stream to convert to a different standard where as a graphics accelerator card has to generate that stream itself. That's why it needs memory and processor time. All a graphics card does is to replace some software routines with hardware. For example, to draw a straight line the processor has to work out what pixels need to be turned on and then do it one pixel at a time. A graphics card will get the command to draw a line and the hardware (or on board processor) will work out where the pixels are and turn them on leaving the main processor free to work out where the next line should be.



converted back again to analogue, to be displayed by the monitor. What did you mean by the way, when you said that RISC TV generates it's own video signal?"


The reason why a video card needs to digitise the video signal is so that it can scale the image into a desktop window and also do time-base correction to allow a TV signal to be shown using the line frequencies used on a monitor. The card takes the analogue signal, digitises it, puts it in it's own internal memory. It then reads that memory out at the appropriate rate and sends it to a digital to analogue converter. This analogue signal is then mixed in with the analogue signal produced from the computer's display and sent to the monitor.

The TV part never enters the computer memory, if you were to do a screen capture with say *Paint* then the area of the TV window will be black. The card switches it's video on and off so that it fills in the blank bit at the appropriate time. As the TV picture is in the "on card" memory it can be read into the computer and displayed at the current graphics resolution of your setup.

Dave Braine has been eyeing the free Internet Service Providers and wants to know if he can join in too:


"Having had access to the Internet via a PC for sometime, I am thinking of connecting with my Risc PC 610 (21Mb RAM, 210Mb HD). Could you tell me if: My machine is suitable in it's present configuration. Also are there free ISPs in the Acorn world equivalent to "Freeserve" and so on for the PC. Lastly can I access all the sites on an Acorn that I can on a PC?"


Yes it is a perfectly reasonable machine for Internet access. There are no Acorn-specific free ISPs as far as I know but you can access most free ISPs with an Acorn while access to sites very much depends on the site. There are some sites you can get on with one PC but can't get on another. The major restriction is how dependent the site is on some plug-in or other.

For example RISC OS support for Flash has only just appeared and it's not complete while the latest versions of Java are not fully implemented (although Javascript is). This will also be the case with the new Internet Banking services, some requiring PC-only software. Others rely on a version of Java that is not available on the Acorn or Macintosh machines.

The Banks, with their usual friendly, customer-oriented approach tell you to get lost if your not using a "standard" computer. The other problem is that the Banks expect you to use a 128-bit encryption standard that US law forbids you to export. So even PC users have to get a European patch for their Internet browsers. In general there will always be sites you can't get at using Acorns because plug-in technology changes very fast.

Our own Mike Buckingham is having problems with a sound mixer among other things:


"Have you ever done an infra-red port? I would have thought the port is easy enough but I guess you'd need the drivers too. I'm interested in *Voyager* (or similar) and *ArcFax*.

I ask because I was wondering about using a mobile telephone with built-in modem for comms on the move with an aged A4. The phone uses IR, or a hard-wired version that treats the RS232 port as though it were IR. Naturally the drivers are for other OSs. If you know of a solution, I'd be interested."


I assume by an infra-red port you are meaning IrDA, this is a standard that is very close to a serial signal and used by most office electronic devices but there are a number of different standards that give faster transfer rates. The two communicating devices should negotiate the fastest speed they can both cope with, this can make the software drivers difficult to write.

On the physical side it is relatively simple, the infra red is off when the serial line is at a mark state and on for only the first third of a space state. This reduces battery drain for portable devices. All the hardware has to do is to stretch the short pulse to convert an IR signal into a serial one and crop space states to convert a serial signal to an IR drive. In the absence of negotiation the speed defaults to 9600 baud, however, as you said what to do with the serial data stream when you have it is the problem.

I do plan to get round to tackling this some day but in the mean time if you want to investigate this standard yourself there is a designers evaluation kit available from Farnell made by Hewlett Packard. The Farnell order code is 942-390 and it contains both data and sample circuit boards.

Mike continued his message by changing the subject:


"I purchased a Minnie 16-bit Sound Card from Atomwide in their sale, and fitted it successfully. It works a treat, however I would still like to connect the CD Audio through the main audio. After having consulted the comp.sys.acorn newsgroups, I was told that if I had an old motherboard in my Risc PC, I would need a mixing card, which would connect to the CD-ROM audio out and then to the mother board.

"It just so happened that a nice man called Bruce Goatly had one going spare. So, I sent Bruce a nice big envelope and I duly had a piece of circuitry on my doorstep. Having tried to fit this card, it doesn't have a connector which fits in the back of the CD-ROM, and there is nowhere on the motherboard that I can see that would accommodate any of the connectors either."


The positioning of the audio output from a CD does vary from manufacturer to manufacturer but mostly they are on a small connector with four contacts in a row towards one side of the back of the drive.

It's not always easy getting a plug to fit it because they are usually on crimped connectors. The mixer attaches to the output of the CD drive and the output of the Minnie board then the output of the mixer goes where the output of the Minnie board used to go, that is the connector on the very edge of the board by the reset switch. **END**

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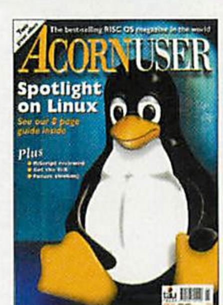
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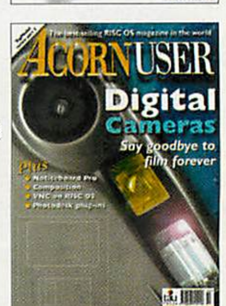
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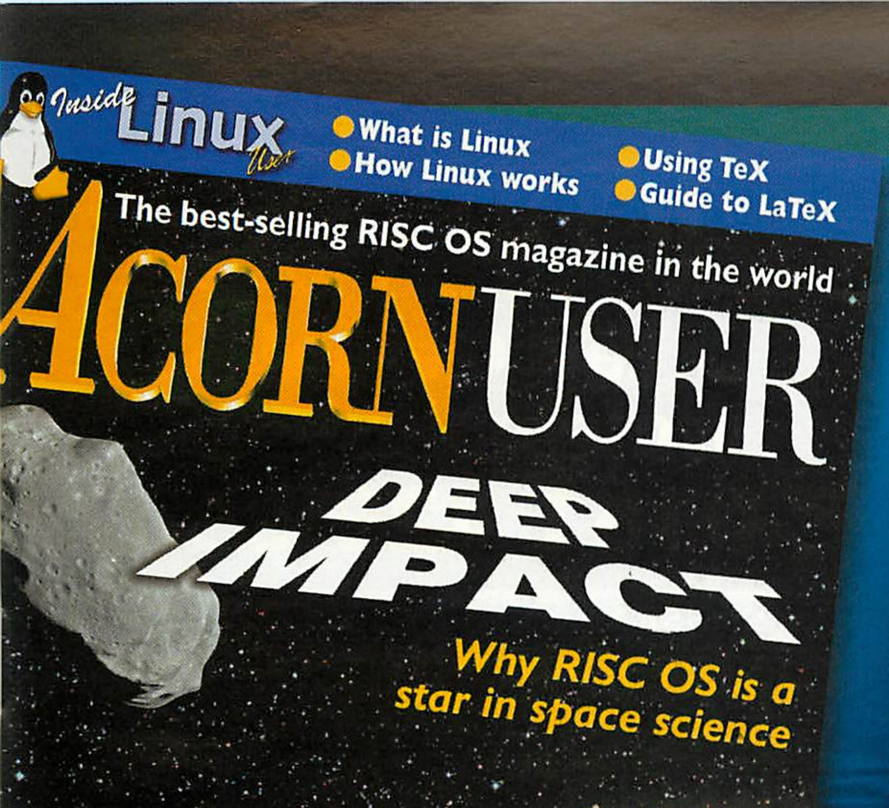
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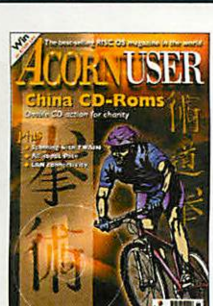
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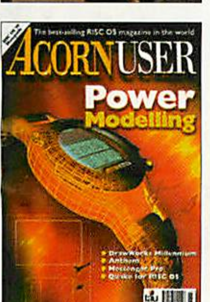
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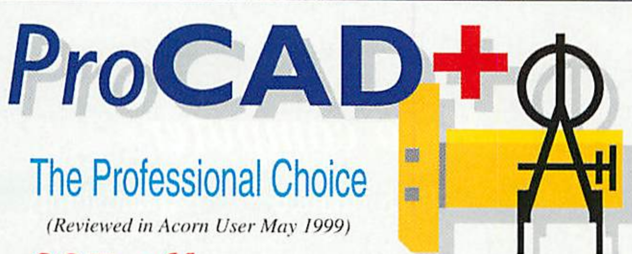
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Linux note

In my article in the April issue of *Acorn User* I said that Linux did not support image filing systems the way that RISC OS does. I have since discovered a Linux project which attempts to do just this, at:

http://atrey.karlin.mff.cuni.cz/~pavel/podfuk/podfuk.html

Thomas Leonard
by e-mail

As an added bonus, and not a lot of people know this, but it seems there is a fairly reasonable Archimedes emulator for Linux. We don't have full details of this at the present time but we're looking into it, more next time.

Lost causes?

Congratulations on a good article (*Reading the Leaves* from the April 2000 issue). No time like the present to get the user base involved in keeping the platform alive. Also (with tongue in cheek) have you considered 'sacking' a few members of your staff and having them apply for jobs in other Gaming/Computing or even PC/Mac mags? You could always 'take them back on again' if they don't get the job. Gives you eyes and ears in that other world, and a convenient way to ensure positive Acorn noises begin spreading...

Lewis Westbury
by e-mail

What's free?

My boss (your very own Mike Cook) has just handed the April edition saying 'heh you'll be interested in this' and, as I am a Linux advocate, I was. I thought the articles were well-written and covered most of the topics. But the one area I felt was missing was the differentiation between 'Open Source' and the 'GPL License'.

To summarise: 'Open Source' means precisely that, you can view the source but it doesn't grant you the right to do anything with it such as change it or use it in your own programs.

The 'GPL License', on the other hand, has been designed so that software that is released under it is 'free' (as in speech). Anyone can use it for whatever purpose they desire, modify it or even use it in their own programs. You must however credit the original author (you can't pretend you wrote it your self) and any software using/based on it must also be released under the GPL. This is intended to ensure that the code can be improved and it's use can never be restricted in the future. For a more complete explanation you can go to:

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Paul Richardson

It's not very long since the genocide in Rwanda was all over the headlines, although few people can remember any of the details. One man who can is Paul Richardson, director of Explan Computers Ltd who are most famous in the RISC OS market for publishing the *HolyBible* software. While I was waiting to interview Paul at a recent show, he said he would leave his son looking after his stand: 'He will be OK – he has to look after it when I go to Rwanda.'

'I am a member of a church in the West Country,' Paul began to explain. 'We met up with a pastor from Kigali who came over after the genocide asking for some help from western churches. Other people from my church had visited Rwanda. I was invited to go out to try and assist them with using computer technology to produce their own Christian teaching material.

> *We sell to the switched-on vicar market*

'It was all RISC OS, because we knew that RISC OS can readily picked up by five or six year olds, in spite of the fact they cannot look something up in a manual because they cannot read. We knew our Kinyarwandan language type problems could be overcome with the graphical interface. OK, the computer does not work in Kinyarwandan, but it has the right sort of feel to it.

'I have taken out a couple of computers and a rather high-quality laser printer with a very low running cost, in consideration of the sort of money they earn out there to keep it going. We have in fact been offered another 360 computers to take out. Most of these I have turned down because we have particular technical needs, but we have another dozen ready to go. They are all what people have donated.'

Paul first got into computers when he was working at a teacher training college and computers came along. He fitted the bill to look after them because he had been previously involved with a company who had built a computer to work in an underwater robot, and so knew which was the hot end of the soldering iron. Explan was started in 1984 and produced a menuing system for use with BBC Bs on Econet. Now most of their work is related to printer drivers or *HolyBible* software.

'We are now the only bible software publisher in Britain. All the rest are supported from the States. We are selling mainly to the switched-on vicar market, archaeologists and the sort of researchers who need that sort of the detail. We have decided to make the Bible software further editable so other people can add to it. Quite a bit of my time is spent encouraging other people, who are professionals in their own fields, to get their material down into a software form.'

Paul, although a Christian, did not set out to do Christian software with Explan; it was through Acorn he got involved because Acorn put him in touch with Martin Würthner.

They met after Martin had already written a version of his Bible software. This worked fine but for the fact it would have been illegal to issue it with the version of the Bible Martin was using. Since Paul knew the contacts to get the licences done properly and to get hold of much better quality master texts, the obvious thing to do was for them to join forces.

'I am no programmer. I think if I had to dabble in the depths of code I would not be as free ranging in the software design. I would be limiting myself to what I could code. I find it very easy to get on with programmers because I can think of an idea or a modification to something they have got working and I can leave them to implement it without having to worry about the complexity of getting it done.

Sometimes I will mention things which I think will be impossible to implement and I fire this off via e-mail and an hour later the new code arrives back.'

'In the RISC OS market we have been through a rocky ride over the past year. Some of the hangers-on have let go and are no longer in the development market, but those who are still in there have got much better cohesion, with lots more cross-pollination of ideas and people working together. In fact I am just going to a confidential meeting on a new project some of us are putting together.'

Jill Regan

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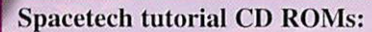


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